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Employee quality, monitoring environment and internal control

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ABSTRACT

We investigate the effect of internal control employees (ICEs) on internal control quality. Using special survey data from Chinese listed firms, we find that ICE quality has a significant positive influence on internal control quality. We examine the effect of monitoring on this result and find that the effect is more pronounced for firms with strict monitoring environments, especially when the firms implement the Chinese internal control regulation system (CSOX), have higher institutional ownership or attach greater importance to internal control. Our findings suggest that ICEs play an important role in the design and implementation of internal control systems. Our study should be of interest to both top managers who wish to improve corporate internal control quality and regulators who wish to understand the mechanisms of internal control monitoring.
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1. Introduction

With the advent of the knowledge economy, human capital rather than physical assets has become the essential strategic resource of businesses. Rajan and Zingales (1998, 2000) have formalized the human capital theory of corporate governance. They argue that governance problems are no longer concentrated at the top of a steep pyramid; the focus of corporate governance in the new millennium must shift to the governance problems of employees. However, previous studies provide limited evidence of the extent to which employees influence corporate actions. In this study, we focus on internal control because internal control is a core component of corporate activities and is thus suitable for assuring the achievement of objectives relating to

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operations, reporting and compliance (COSO, 2013). We contribute to the literature on internal control by examining the relationship between internal control employees (ICEs) and internal control quality, and the effect of monitoring on this relationship.

Specifically, we ask two complementary research questions. Our first question examines whether ICE quality influences internal control quality. We argue that high quality ICEs increase the human capital investments in the design and implementation of internal control process, and thus improve internal control quality.

Our second question examines whether the monitoring environment modifies the effect of ICE quality on internal control quality. Although we predict that ICE quality has a positive influence on internal control quality, it is possible that this influence may vary between firms that are stringently monitored and firms that are not stringently monitored by regulators, institutional investors and/or top managers. Stringent monitoring could alleviate the employee agency problem and provide ICEs with incentives not to shirk. The increased diligence of employees further promotes the positive effects of ICE quality. Therefore, we expect that the positive effect of ICE quality on internal control quality is more pronounced in firms that are subject to more stringent monitoring.

Using special survey data from Chinese listed firms, we study a sample of 1522 firm-year observations from the 2011 to 2013 period. We use number, education and job tenure as the quality attributes of ICEs, and find that high quality ICEs improve internal control quality. Further, we examine the effect of monitoring on this relationship, and find that the positive effect of ICE quality is more pronounced for firms in stringent monitoring environments. In particular, we find that the positive effect is more significant when firms implement the Chinese internal control regulation system (CSOX), have higher institutional ownership or attach greater importance to internal control. Our results are robust to the misreporting problem of internal control weaknesses, endogeneity bias and chairman turnover.

Our study contributes to two streams of research. Our first contribution was to the internal control literature. To the best of our knowledge, this is the first study to demonstrate the influence of ICEs on internal control quality. There is a large and growing literature examining the determinants of internal control quality (e.g., Doyle et al., 2007; Ashbaugh-Skaife et al., 2007; Hoitash et al., 2009), but no study has examined the influence of ICEs. Given the increased importance of human capital in effective internal control (Doyle et al., 2007), we use special survey data from Chinese listed firms to examine how ICEs influence internal control quality. Our findings suggest that high quality ICEs are more likely to effectively discharge their responsibilities, thus increasing internal control quality.

Our second contribution was to the literature on the employee agency problem. To our knowledge, prior research has not examined the effect of monitoring mechanisms on the employee agency problem. We help fill this gap by providing the first evidence of the effect of monitoring on the relationship between ICEs and internal control quality. Our results suggest that monitoring by regulators, institutional investors and/or top managers could alleviate the employee agency problem and improve the positive effect of ICE quality.

The rest of this paper proceeds as follows. Section 2 introduces the institutional background and reviews related studies. Section 3 provides theoretical analysis and hypothesis development. Section 4 describes the research design, Sections 5 and 6 report the empirical results and robustness tests, respectively, and Section 7 concludes the paper.

2. Institutional background and literature review

2.1. Institutional background

In recent years, Chinese regulators have issued a series of internal control regulations. In May 2008, the five ministries, including the Ministry of Finance (MOF) and China Securities Regulatory Commission (CSRC), jointly issued the Basic Standards of Enterprise Internal Control (hereafter, the Basic Standards). In April 2010, the five ministries jointly issued a series of internal control guidelines, including the Implementation Guidelines for Enterprise Internal Control, the Guidelines for Assessment of Enterprise Internal Control and the Guidelines for Audit of Enterprise Internal Control. The Basic Standards and these guidelines constitute the internal control regulation system in China, which is also called CSOX.

Similar to the Sarbanes–Oxley Act in the United States, CSOX requires listed firms to carry out effective self-assessments of their internal control, to issue self-assessment reports on an annual basis and to appoint audit firms to audit internal control effectiveness and issue auditors' reports. Firms cross-listed on domestic and international exchanges have been required to adopt CSOX since 1 January 2011, and firms listed on the main boards of the Shanghai Stock Exchange (SSE) and Shenzhen Stock Exchange (SZSE) have been required to do so since 1 January 2012.

In February 2011, CSRC issued the Notice on the Assignments of Internal Control Pilots in Listed Firms and selected 216 listed firms as internal control pilots. The key pilot firms were required to adopt CSOX in 2011, and the other pilot firms have been required to do so since 2012.

In August 2012, MOF and CSRC jointly issued the Notice on Partial Implementation of Internal Control Regulation System by Main Board Listed Firms in 2012 (hereafter, the Notice), which postponed the implementation date for firms listed on the main boards of the SSE and SZSE. The Notice required that: "(1) Both central and local state owned listed firms should adopt CSOX in 2012 and disclose their annual self-assessments and auditors' reports on internal control along with their 2012 annual reports; (2) Non-state owned main board firms whose market values are larger than 5 billion RMB on 31 December 2011 and average net profits between 2009 and 2011 are larger than 30 million RMB, should disclose their annual self-assessments and auditors' reports on internal control along with their 2013 annual reports; (3) Other main board firms should disclose their annual self-assessments and auditors' reports on internal control along with their 2014 annual reports." MOF and CSRC do not require the firms listed on the Small and Medium-size Enterprise Board or the ChiNext market to implement CSOX.

2.2. Literature review

Our study is related to the following two research areas: (1) determinants of internal control quality; and (2) the employee agency problem.

2.2.1. Determinants of internal control quality

Previous studies have examined the determinants of internal control quality along the following three dimensions. First, from the perspective of corporate characteristics, many studies have investigated the effects of the complexity and scope of operations, organizational change, internal control resources and accounting application risk on internal control weaknesses (e.g., Doyle et al., 2007; Ashbaugh-Skaife et al., 2007; Lin and Rao, 2009; Tian et al., 2010; Rice and Weber, 2012). They all find that relative to non-disclosers, firms that disclose internal control weaknesses have more complex operations, recent organizational changes, greater accounting risk and fewer resources available for internal control.

Second, from the perspective of top management's characteristics, Li et al. (2010) examine the effect of CFOs' professional qualifications on internal control weaknesses and prove that firms that disclose internal control weaknesses have less-qualified CFOs.

Third, from the perspective of governance mechanisms, Krishnan (2005), Naiker and Sharma (2009) and Hoitash et al. (2009) analyze the effects of audit committee characteristics on internal control weaknesses and find that independent audit committees and audit committees with financial expertise are significantly less likely to be associated with incidences of internal control weaknesses. Masli et al. (2010) document that the implementation of internal control monitoring technology is associated with the lower likelihood of internal control material weaknesses. Lin et al. (2011) examine the relationship between material weakness disclosures and internal audit function and observe that material weakness disclosures are negatively associated with internal audit quality. Gong et al. (2013) argue that for cross-listed firms domiciled in weak investor protection countries, firms whose managers control their firms and have voting rights in excess of cash flow rights are more likely to misreport internal control weaknesses than other firms. Balsam et al. (2014) examine the relation between executive equity incentives and material weaknesses and prove that the likelihood of material weakness disclosures decreases with increases in equity incentives. Last but not the least, Guo et al. (2016) provide empirical evidence that personnel-friendly practices significantly attenuate internal control ineffectiveness.

In summary, although previous studies have examined the determinants of internal control from different perspectives, no study has investigated the influence of employees. Recognizing the increased importance of

human capital in effective internal control, we focus on ICEs and examine the effect of ICEs on internal control quality.

2.2.2. Employee agency problem

Prior studies have provided evidence that employees play an important role in corporate activities. For example, Edmans (2011) analyzes the relationship between employee satisfaction and long-term stock returns, and proves that employee satisfaction is positively correlated with shareholder returns. Bae et al. (2011) investigate corporate capital structure from the perspective of a firm's relations with its employees, and find that firms that treat their employees fairly maintain low debt ratios. Wu and Liu (2009) examine the effect of employee quality on R&D activities using special survey data from private firms in China, and document that employee quality has a significantly positive effect on R&D activities. Huang and Li (2014) investigate the relationship between employees and investment using special data from manufacturing firms in China, and find that the number of employees is positively associated with over-investment when firms face unfavorable investment opportunities.

However, the existence of the employee agency problem attenuates the positive effects of employees. Previous studies have examined how to alleviate the employee agency problem through motivation mechanisms such as compensation, stock options and ownership. For example, Chen et al. (2015) argue that employee compensation incentives have a significantly positive effect on earnings growth. Chang et al. (2015) provide empirical evidence of the positive effect of non-executive employee stock options on corporate innovation. Bova et al. (2015a, 2015b) document that employee ownership is positively associated with voluntary disclosure and negatively associated with risk. Kim and Ouimet (2014) find that small employee stock ownership plans increase corporate productivity, but the effect is weaker when there are too many employees to mitigate free-riding.

To the best of our knowledge, there is no research examining the effect of monitoring on the employee agency problem. Hence, we focus on ICEs and investigate the effect of monitoring on the relationship between ICEs and internal control quality, which helps to fill the gap in the literature on the employee agency problem.

3. Theoretical analysis and hypothesis development

We develop our research questions on the basis of the input-process-output theory and agency theory. First, Gladstein (1984) has formalized the input-process-output theory of group effectiveness, and highlights that group composition, such as employee quality, has a critical effect on group effectiveness. Therefore, our first research question is, in terms of ICE teams, does ICE quality influence internal control quality?

Second, according to agency theory, the preference for leisure induces employees to reduce their productive effort, thus leading to the agency conflict between top managers and employees (Alchian and Demsetz, 1972). A remedy to this problem is to invest resources into monitoring employees (Holmstrom, 1979). Therefore, our second research question is, in terms of internal control activities, does stringent monitoring promote the positive effect of ICE quality on internal control quality by improving ICE work efficiency?

Our theoretical framework is presented in Fig. 1. Based on this framework, we develop our hypotheses.

3.1. ICE quality and internal control quality

In his formalization of the input-process-output theory, Gladstein (1984) emphasizes that team composition, team structure, resources available and organizational structure are the four major determinants of team effectiveness. As a part of team composition, employee qualities such as the number, education degree and job tenure of employees assume enormous importance. Based on the input-process-output theory, we focus on ICE teams and argue that ICE quality could influence internal control effectiveness both directly and indirectly, as shown in Fig. 1. On the one hand, Ge and McVay (2005) indicate that a shortage of qualified staff is a common cause of internal control ineffectiveness. So high quality ICEs are more likely to discharge their responsibilities to adequately design and implement internal control policies and procedures, which directly increase internal control quality.

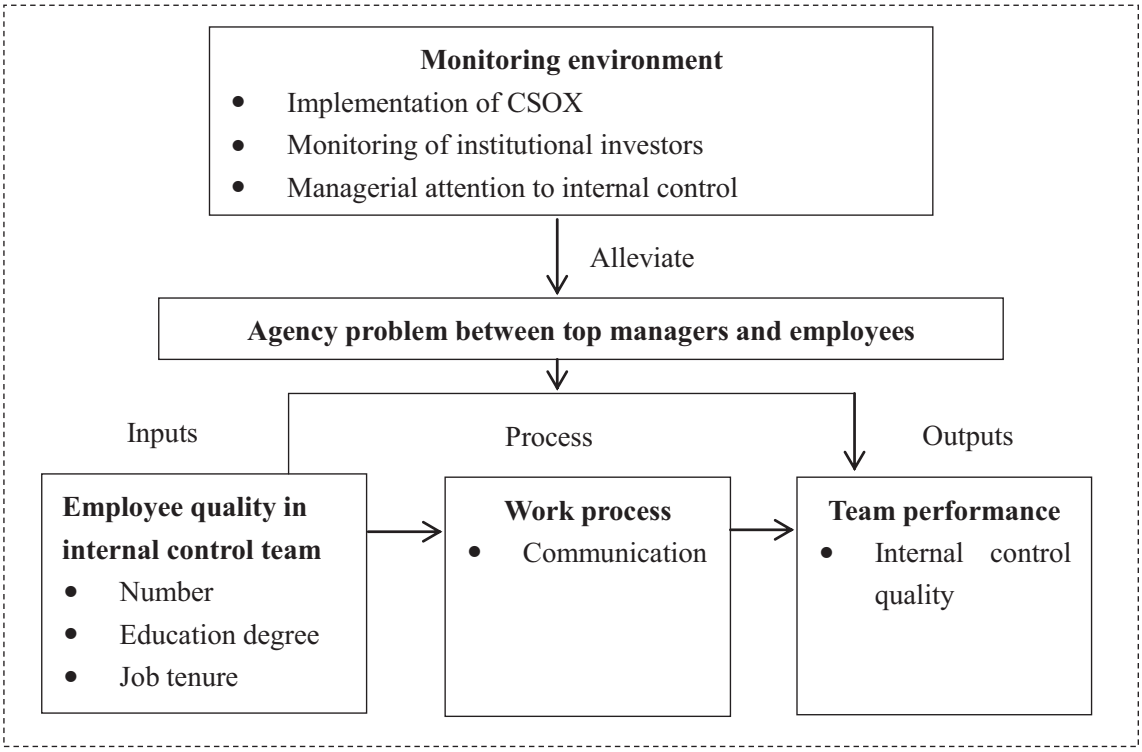

Figure 1. Theoretical framework.

On the other hand, ICE quality indirectly influences internal control quality through work processes. Take job tenure as an example: ICEs with long job tenure are more familiar with corporate culture and internal communication styles, and this improves the efficiency of the communication process (Zenger and Lawrence, 1989). Moreover, communication efficiency is crucial to internal control quality because the essential components of internal control work include communicating with top managers to establish and improve the internal control system, communicating with employees to monitor regular control activities and communicating with internal and external auditors to provide audit assistance. Hence, ICEs with long job tenures could indirectly increase internal control quality by improving communication efficiency.

Based on the above discussion, we use the number, education and job tenure of ICEs as proxies for ICE quality, and specify our first hypothesis as follows.

H1. ICE quality has a positive influence on internal control quality.

Agency problems exist not only between shareholders and top managers, but also between top managers and employees (Weber, 1947; Holmstrom and Milgrom, 1994). Employees usually prefer leisure and have an incentive to shirk (Jensen and Meckling, 1976), which attenuates the positive effect of employee quality. Could monitoring alleviate the employee agency problem and improve the positive effect of ICE quality on internal control quality? To address this research question, we examine the influence of three different monitoring mechanisms (i.e., implementation of CSOX, institutional investors and managerial attention) on the relationship between ICE quality and internal control quality.

3.2. Implementation of CSOX

The internal control self-assessment reports voluntarily disclosed by listed firms before the implementation of CSOX are devoid of substance (Tian et al., 2010), as it is difficult for regulators to carry out effective

monitoring of internal control without clear guidelines. The relaxed monitoring in the pre-CSOX period increases the possibility of ICE shirking and reduces the positive effect of ICE quality on internal control quality.

In contrast, since the implementation of CSOX listed firms is required to issue self-assessment and audit reports on internal control in accordance with CSOX guidelines, such monitoring improves the positive effect of ICE quality through the following two channels. First, the implementation of CSOX increases the workload of ICEs. The detailed requirements in CSOX reduce the arbitrariness of internal control self-assessment, forcing ICEs to work harder and alleviating the employee agency problem. For example, according to CSOX requirements, ICEs should "obtain sufficient appropriate evidence to be able to assess the effectiveness of design and implementation of internal control through a variety of approaches, including inquiry, survey, discussion, walk through testing, field inspection, sampling and comparative analysis."

Second, the implementation of CSOX strengthens the external monitoring of internal control. CSOX provides clear guidelines for regulators and external auditors and improves their ability to monitor internal control. The enhanced external monitoring reduces the possibility of ICE shirking and improves the positive effect of ICE quality on internal control quality. Based on the preceding arguments, we propose the following hypothesis.

H2. The positive effect of ICE quality on internal control quality is more pronounced in the post-CSOX period.

3.3. Monitoring of institutional investors

Previous studies have shown that institutional investors influence corporate governance in two ways. First, by voting with their feet: Institutional investors can indirectly express their attitudes by buying or selling stocks. Second, by voting with their hands: Institutional investors can serve as active monitors and influence corporate governance through their voting rights. Institutional investors with large equity positions have greater incentives to play a monitoring role, because the benefits they receive from their monitoring activities are more likely to exceed the costs of monitoring (Shleifer and Vishny, 1986). Moreover, large ownership positions allow institutional investors to exert greater influence on corporate governance, which further motivates them to serve as active monitors rather than free-riders.

As internal control is essential for corporate governance, institutional investors have an incentive to monitor internal control quality, especially when they have large ownership positions. The monitoring of institutional investors prevents ICEs from shirking and increases the positive effect of ICE quality on internal control quality. This leads to our third hypothesis.

H3. The positive effect of ICE quality on internal control quality is more pronounced among firms with higher institutional ownership.

3.4. Managerial attention to internal control

The tone set by top management is fundamental to the functioning of an internal control system (COSO, 2013). High managerial attention to internal control could alleviate the agency problem between top managers and employees. Specifically, when top managers attach great importance to internal control, they will devote more effort to ICE monitoring, which reduces the possibility of ICE shirking and increases the positive effect of ICE quality. In contrast, when top managers pay little attention to internal control and ICE monitoring, ICEs will be inclined to take more leisure, which further reduces the positive effect of ICE quality. Based on the preceding arguments, we propose the following hypothesis.

H4. The positive effect of ICE quality on internal control quality is more pronounced when top managers attach greater importance to internal control.

4. Research design

4.1. Data and sample selection

Our data for ICE quality and managerial attention come from the 2014 Internal Control Survey of Chinese Listed Firms. This questionnaire survey was conducted by the Research Group of Internal Control to examine the internal control status of Chinese listed firms. The questionnaires were distributed to all 2536 listed firms on 5 September 2014 and collected on 31 October 2014, with a recovery rate of 84.94%. In early November 2014, the Research Group of Internal Control randomly chose 12 respondents for field investigation to confirm the validity of the survey responses.

This survey provides ICE quality data for the 2011 to 2013 period, including the number, education and job tenure of ICEs. As stated in the questionnaire, ICEs include the employees who are commonly responsible for the establishment and regular monitoring of internal control, but exclude employees in the internal audit department, the internal control manager and other top managers.

The survey also provides information about managerial attention. Specifically, chairmen are required to answer the following question: In your opinion, to what extent does your firm demand internal control? A. Not at all; B. A little; C. Fair; D. Much; E. Very much.

Our sample starts with all of the Chinese non-financial firms with effective ICE data for the 2011 to 2013 period. First, we remove the firms listed on the Small- and Medium-sized Enterprise board and the ChiNext market, because these firms are not required to implement CSOX and their internal control regulations are systematically different from those of firms listed on the main boards. Next, we merge the remaining observations with the DIB internal control database, CSMAR database and WIND database. Finally, we drop observations with missing variable information. Our final sample contains 1522 firm-year observations.

4.2. Model specification and variable description

4.2.1. Models of H1

To test the effect of ICE quality on internal control quality, we estimate the following models, drawn from previous studies (e.g., Doyle et al., 2007; Ashbaugh-Skaife et al., 2007):

$$\begin{aligned} ICW = {} & \beta_0 + \beta_1 NUM + \beta_2 EDU + \beta_3 CORPEXP + \beta_4 MA + \beta_5 GROWTH + \beta_6 INVENTORY + \beta_7 LEV \\ & + \beta_8 SIZE + \beta_9 AGE + \beta_{10} DISTRESS + \beta_{11} AUDITOR + \beta_{12} AUDITOR\_RESIGNED \\ & + \beta_{13} TOPSHAREHOLDER + \beta_{14} INSTITUTION + \beta_{15} DEMAND + \beta_{16} SOE + \sum YEAR \\ & + \sum INDUSTRY + \varepsilon; \text{ and} \end{aligned} \tag{1}$$

$$\begin{aligned} ICW = {} & \beta_0 + \beta_1 QUALITY + \beta_2 MA + \beta_3 GROWTH + \beta_4 INVENTORY + \beta_5 LEV + \beta_6 SIZE + \beta_7 AGE \\ & + \beta_8 DISTRESS + \beta_9 AUDITOR + \beta_{10} AUDITOR\_RESIGNED + \beta_{11} TOPSHAREHOLDER \\ & + \beta_{12} INSTITUTION + \beta_{13} DEMAND + \beta_{14} SOE + \sum YEAR + \sum INDUSTRY + \varepsilon. \end{aligned} \tag{2}$$

ICW is an indicator variable that is coded 1 if the firm discloses at least one internal control weakness in the given fiscal year, and 0 otherwise. We use *ICW* as the dependent variable to measure internal control quality; the disclosure of internal control weaknesses means low internal control quality.

With respect to explanatory variables, we use number (*NUM*), education (*EDU*) and job tenure (*CORPEXP*) to measure ICE quality in model 1. Specifically, *NUM* equals the fiscal year-end number of ICEs deflated by the total number of employees times 100. *EDU* equals the fiscal year-end number of ICEs with a bachelor degree or above deflated by the total number of ICEs. *CORPEXP* equals the fiscal year-end number of ICEs who have worked in the firm no less than 5 years deflated by the total number of ICEs.

We construct a comprehensive ICE quality measure (*QUALITY*) in model 2. Specifically, $QUALITY = NUM\_dummy + EDU\_dummy + CORPEXP\_dummy$, where *NUM_dummy*, *EDU_dummy* or *CORPEXP_dummy* are indicator variables that are coded 1 if the value for *NUM*, *EDU* or *CORPEXP* is larger than the mean of the sample in the same fiscal year and industry, and 0 otherwise.

With respect to control variables, Doyle et al. (2007) and Ashbaugh-Skaife et al. (2007) find that the complexity and scope of operations, internal control resources and governance mechanisms influence internal control quality. Accordingly, we include M&A activities (*MA*), percentage change of sales (*GROWTH*), percentage of inventory (*INVENTORY*) and leverage ratio (*LEV*) to control for the effects of the complexity and scope of operations. We also include firm size (*SIZE*), listed years (*AGE*) and the severity of financial distress (*DISTRESS*) to control for the effects of internal control resources. We add the use of a Big 4 audit firm (*AUDITOR*), change of auditors (*AUDITOR_RESIGNED*), largest shareholder ownership (*TOPSHAREHOLDER*) and institutional ownership (*INSTITUTION*) to capture the effects of governance mechanisms. In addition, we control for chairman's attention to internal control (*DEMAND*), state-owned firms (*SOE*), year dummy variables and industry dummy variables. Detailed definitions of each variable are given in Table 1.

4.2.2. Models of H2

To test H2, we construct four interaction terms and estimate the following models:

Table 1
Summary of variables.

Variables	Definitions
Dependent variable	
ICW	Indicator variable that is coded 1 if the firm discloses at least one internal control weakness in the given fiscal year, and 0 otherwise
Explanatory variables	
NUM	The fiscal year-end number of ICEs deflated by the total number of employees times 100
EDU	The fiscal year-end number of ICEs with bachelor degrees or above deflated by the total number of ICEs
CORPEXP	The fiscal year-end number of ICEs who have worked in the firm no less than 5 years deflated by the total number of ICEs
QUALITY	$QUALITY = NUM\_dummy + EDU\_dummy + CORPEXP\_dummy$, where *NUM_dummy*, *EDU_dummy* or *CORPEXP_dummy* are indicator variables that are coded 1 if *NUM*, *EDU* or *CORPEXP* is larger than the mean of the sample in the same fiscal year and industry, and 0 otherwise
CSOX	Indicator variable that is coded 1 if the firm is required to implement CSOX in the given fiscal year, and 0 otherwise
INST	Indicator variable that is coded 1 if the percentage of shares held by the largest institutional investor at fiscal year-end is larger than the mean of the sample in the same fiscal year and industry
DEMAND	Indicator variable that is coded 1 if the chairman thinks that the firm needs internal control very much, and 0 otherwise
Control variables	
MA	Indicator variable that is coded 1 if the firm engages in mergers or acquisitions in the given fiscal year, and 0 otherwise
GROWTH	Percentage change in fiscal year-end sales
INVENTORY	Inventory deflated by total assets at fiscal year-end
LEV	Total liabilities deflated by total assets at fiscal year-end
SIZE	Natural logarithm of total assets at fiscal year-end
AGE	Natural logarithm of the number of years since the firm listed on the main boards
DISTRESS	Decile rank (by year) of the Altman *z*-score
AUDITOR	Indicator variable that is coded 1 if the firm is audited by a Big 4 audit firm, and 0 otherwise
AUDITOR_RESIGNED	Indicator variable that is coded 1 if the audit firm changes in the fiscal year, and 0 otherwise
TOPSHAREHOLDER	Percentage of shares held by the largest shareholder at fiscal year-end
INSTITUTION	Percentage of shares held by institutional investors at fiscal year-end
SOE	Indicator variable that is coded 1 if the firm is owned by state, and 0 otherwise
YEAR	Year dummy variables
INDUSTRY	Industry dummy variables

$$ICW = \beta_0 + \beta_1 NUM + \beta_2 EDU + \beta_3 CORPEXP + \beta_4 CSOX + \beta_5 NUM * CSOX + \beta_6 EDU * CSOX + \beta_7 CORPEXP * CSOX + \beta_8 MA + \beta_9 GROWTH + \beta_{10} INVENTORY + \beta_{11} LEV + \beta_{12} SIZE + \beta_{13} AGE + \beta_{14} DISTRESS + \beta_{15} AUDITOR + \beta_{16} AUDITOR\_RESIGNED + \beta_{17} TOPSHAREHOLDER + \beta_{18} INSTITUTION + \beta_{19} DEMAND + \beta_{20} SOE + \sum YEAR + \sum INDUSTRY + \varepsilon; \text{ and} \quad (3)$$

$$ICW = \beta_0 + \beta_1 QUALITY + \beta_2 CSOX + \beta_3 QUALITY * \text{CSOX} + \beta_4 MA + \beta_5 GROWTH + \beta_6 INVENTORY + \beta_7 LEV + \beta_8 SIZE + \beta_9 AGE + \beta_{10} DISTRESS + \beta_{11} AUDITOR + \beta_{12} AUDITOR\_RESIGNED + \beta_{13} TOPSHAREHOLDER + \beta_{14} INSTITUTION + \beta_{15} DEMAND + \beta_{16} SOE + \sum YEAR + \sum INDUSTRY + \varepsilon. \quad (4)$$

CSOX is an indicator variable that is coded 1 if the firm is required to implement CSOX in the given fiscal year, and 0 otherwise. Specifically, variable *CSOX* is coded 1 only for the following observations: (1) cross-listed firms and key pilot firms in the 2011 to 2013 period; (2) state owned listed firms and other pilot firms from the 2012 to 2013 period; and (3) non-state owned main board firms in 2013 whose market values are larger than 5 billion RMB on 31 December 2011 and whose average net profits in the 2009 to 2011 period are larger than 30 million RMB.

We multiply *CSOX* by *NUM*, *EDU*, *CORPEXP* and *QUALITY* to construct interaction terms (*NUM* * *CSOX*, *EDU* * *CSOX*, *CORPEXP* * *CSOX* and *QUALITY* * *CSOX*), and investigate whether the implementation of CSOX influences the positive effect of ICE quality. The other variables in models 3 and 4 are similar to those in models 1 and 2. Detailed definitions of all of the variables are given in Table 1.

4.2.3. Models of H3

To test H3, we construct four interaction terms and estimate the following models:

$$ICW = \beta_0 + \beta_1 NUM + \beta_2 EDU + \beta_3 CORPEXP + \beta_4 INST + \beta_5 NUM * INST + \beta_6 EDU * INST + \beta_7 CORPEXP * INST + \beta_8 MA + \beta_9 GROWTH + \beta_{10} INVENTORY + \beta_{11} LEV + \beta_{12} SIZE + \beta_{13} AGE + \beta_{14} DISTRESS + \beta_{15} AUDITOR + \beta_{16} AUDITOR\_RESIGNED + \beta_{17} TOPSHAREHOLDER + \beta_{18} INSTITUTION + \beta_{19} DEMAND + \beta_{20} SOE + \sum YEAR + \sum INDUSTRY + \varepsilon; \text{ and} \quad (5)$$

$$ICW = \beta_0 + \beta_1 QUALITY + \beta_2 INST + \beta_3 QUALITY * INST + \beta_4 MA + \beta_5 GROWTH + \beta_6 INVENTORY + \beta_7 LEV + \beta_8 SIZE + \beta_9 AGE + \beta_{10} DISTRESS + \beta_{11} AUDITOR + \beta_{12} AUDITOR\_RESIGNED + \beta_{13} TOPSHAREHOLDER + \beta_{14} INSTITUTION + \beta_{15} DEMAND + \beta_{16} SOE + \sum YEAR + \sum INDUSTRY + \varepsilon. \quad (6)$$

INST is an indicator variable that is coded 1 if the percentage of shares held by the largest institutional investor at fiscal year-end is larger than the mean of the sample in the same fiscal year and industry. It is worth noting that we only focus on the largest institutional investors, as they are most likely to serve as active monitors (Shleifer and Vishny, 1986). We multiply *INST* by *NUM*, *EDU*, *CORPEXP* and *QUALITY* to construct interaction terms (*NUM* * *INST*, *EDU* * *INST*, *CORPEXP* * *INST* and *QUALITY* * *INST*), and investigate whether the monitoring of institutional investors influences the positive effect of ICE quality. The other variables in models 5 and 6 are similar to those in models 1 and 2. Detailed definitions of all of the variables are given in Table 1.

4.2.4. Models of H4

To test H4, we construct four interaction terms and estimate the following models:

$$ICW = \beta_0 + \beta_1 NUM + \beta_2 EDU + \beta_3 CORPEXP + \beta_4 DEMAND + \beta_5 NUM * DEMAND + \beta_6 EDU * DEMAND + \beta_7 CORPEXP * DEMAND + \beta_8 MA + \beta_9 GROWTH + \beta_{10} INVENTORY + \beta_{11} LEV + \beta_{12} SIZE + \beta_{13} AGE + \beta_{14} DISTRESS + \beta_{15} AUDITOR + \beta_{16} AUDITOR\_RESIGNED + \beta_{17} TOPSHAREHOLDER + \beta_{18} INSTITUTION + \beta_{19} SOE + \sum YEAR + \sum INDUSTRY + \varepsilon; \text{ and} \quad (7)$$

$$ICW = \beta_0 + \beta_1 QUALITY + \beta_2 DEMAND + \beta_3 QUALITY * DEMAND + \beta_4 MA + \beta_5 GROWTH + \beta_6 INVENTORY + \beta_7 LEV + \beta_8 SIZE + \beta_9 AGE + \beta_{10} DISTRESS + \beta_{11} AUDITOR + \beta_{12} AUDITOR\_RESIGNED + \beta_{13} TOPSHAREHOLDER + \beta_{14} INSTITUTION + \beta_{15} SOE + \sum YEAR + \sum INDUSTRY + \varepsilon. \quad (8)$$

We use the attitude of each company's chairman toward internal control as a proxy for managerial attention, and assume that a chairman's attitude remains unchanged throughout the 2011 to 2013 period. *DEMAND* is an indicator variable that is coded 1 if the chairman thinks that the firm needs internal control very much, and 0 otherwise. We multiply *DEMAND* by *NUM*, *EDU*, *CORPEXP* and *QUALITY* to construct interaction terms (*NUM* * *DEMAND*, *EDU* * *DEMAND*, *CORPEXP* * *DEMAND* and *QUALITY* * *DEMAND*), and investigate whether managerial attention to internal control influences the positive effect of ICE quality. The other variables in models 7 and 8 are similar to those in models 1 and 2. Detailed definitions of all of the variables are given in Table 1.

4.3. Descriptive statistics

Table 2 presents the descriptive statistics for all of the variables. We winsorize all of the continuous variables at the 0.01 and 0.99 levels. In Table 2, the mean of *ICW* is 0.214, which indicates that 21.4% of the observations disclose internal control weaknesses. The mean of *NUM* is 0.616, indicating that on average, ICEs make up about 0.6% of the total number of employees. The mean of *EDU* is 0.792, indicating that 79.2%

Table 2
Descriptive statistics.

	n	mean	p50	sd	min	p25	p75	max
ICW	1522	0.214	0.000	0.410	0.000	0.000	0.000	1.000
NUM	1522	0.616	0.192	1.376	0.006	0.085	0.477	10.092
EDU	1522	0.792	0.921	0.257	0.000	0.630	1.000	1.000
CORPEXP	1522	0.590	0.667	0.344	0.000	0.333	0.925	1.000
QUALITY	1522	1.360	1.000	0.752	0.000	1.000	2.000	3.000
CSOX	1522	0.650	1.000	0.477	0.000	0.000	1.000	1.000
INST	1522	0.365	0.000	0.482	0.000	0.000	1.000	1.000
DEMAND	1522	0.587	1.000	0.492	0.000	0.000	1.000	1.000
MA	1522	0.751	1.000	0.433	0.000	1.000	1.000	1.000
GROWTH	1522	0.202	0.087	0.739	–0.542	–0.039	0.218	6.261
INVENTORY	1522	0.194	0.139	0.187	0.000	0.065	0.250	0.823
LEV	1522	0.538	0.555	0.204	0.078	0.395	0.690	0.984
SIZE	1522	22.461	22.307	1.335	19.091	21.602	23.298	26.483
AGE	1522	2.604	2.708	0.468	0.693	2.485	2.890	3.091
DISTRESS	1522	5.435	5.000	2.856	1.000	3.000	8.000	10.000
AUDITOR	1522	0.087	0.000	0.282	0.000	0.000	0.000	1.000
AUDITOR_RESIGNED	1522	0.073	0.000	0.260	0.000	0.000	0.000	1.000
TOPSHAREHOLDER	1522	37.892	36.120	16.342	7.850	24.380	50.030	78.020
INSTITUTION	1522	0.402	0.417	0.213	0.005	0.245	0.567	0.846
SOE	1522	0.628	1.000	0.483	0.000	0.000	1.000	1.000

of ICEs have bachelor or higher degrees. The mean of *CORPEXP* is 0.590, indicating that 59% of ICEs have worked at the same firm for no less than 5 years.

5. Empirical results

5.1. Multivariate analysis of H1

We use models 1 and 2 to test whether ICE quality significantly influences internal control quality. All of the significance tests in our study are two-tailed tests. Multicollinearity tests show that the means of the variance inflation factors in models 1 and 2 are 1.44 and 1.45, respectively, indicating that there are no multicollinearity problems in our empirical models.

The regression results are shown in Table 3. Our explanatory variables of interest, the coefficients of *NUM*, *EDU* and *QUALITY*, are significantly negative. These results provide support for H1 by suggesting that high ICE quality increases the human capital investments in the design and implementation of internal control processes, thus increasing internal control quality. The results of the control variables in Table 3 are consistent with previous studies.

5.2. Multivariate analysis of H2

We examine whether the implementation of CSOX influences the effect of ICE quality on internal control quality. As explained above, the implementation of CSOX not only imposes detailed requirements on internal control work, but also strengthens the monitoring of regulators and external auditors. Enhanced external monitoring reduces the possibility of ICE shirking and improves the positive effect of ICE quality. Hence, we expect that the positive effect of ICE quality on internal control quality is more pronounced after the implementation of CSOX.

To test this conjecture, we conduct two tests. The results are given in Table 4. First, we re-estimate models 1 and 2 separately on a sample of firms that have not implemented CSOX (the "PRE" sample, i.e., $CSOX = 0$) and on a sample of firms that have implemented CSOX (the "POST" sample, i.e., $CSOX = 1$). The results are reported in columns (1), (2), (4) and (5) of Table 4. Consistent with our expectation, we find that *NUM*, *EDU*, *CORPEXP* and *QUALITY* have no significant effect on internal control weaknesses in the pre-CSOX sample. In contrast, the coefficients of *NUM*, *EDU* and *QUALITY* are negative and significant at the 0.01 level in the post-CSOX sample.

Second, we add the interaction terms and perform the full sample regressions using models 3 and 4. As shown in columns (3) and (6) of Table 4, the coefficients of $NUM * CSOX$, $EDU * CSOX$ and $QUALITY * CSOX$ are significantly negative. These results suggest that the implementation of CSOX alleviates the employee agency problem and improves the positive effect of ICE quality, thereby supporting H2.

5.3. Multivariate analysis of H3

We examine whether institutional ownership influences the effect of ICE quality on internal control quality. As explained above, large ownership positions motivate institutional investors to play an active role in ICE monitoring, thus reducing the possibility of ICE shirking and improving the positive effect of ICE quality. Hence, we expect that the positive effect of ICE quality on internal control quality is more pronounced among firms with higher institutional ownership.

To test this conjecture, we conduct two tests. The results are given in Table 5. First, we re-estimate models 1 and 2 separately on a sample of firms with lower institutional ownership (the "LOW" sample, i.e., $INST = 0$) and another sample of firms with higher institutional ownership (the "HIGH" sample, i.e., $INST = 1$). The results are reported in columns (1), (2), (4) and (5) of Table 5. Consistent with our expectation, only the coefficient of *NUM* is significantly negative when institutional ownership is relatively low. In contrast, all of the coefficients of *NUM*, *EDU* and *QUALITY* are negative and significant at the 0.01 level when institutional ownership is relatively high.

Table 3
ICE quality and internal control quality.

	(1) *ICW*	(2) *ICW*	(3) *ICW*	(4) *ICW*	(5) *ICW*
NUM	–0.138**			–0.145**	
	(–2.25)			(–2.31)	
EDU		–0.757***		–0.782***	
		(–2.91)		(–2.91)	
CORPEXP			0.122	–0.012	
			(0.56)	(–0.05)	
QUALITY					–0.195**
					(–2.17)
MA	–0.003	0.020	0.017	0.004	0.004
	(–0.02)	(0.13)	(0.11)	(0.03)	(0.03)
GROWTH	–0.005	–0.030	–0.038	0.002	–0.031
	(–0.04)	(–0.28)	(–0.35)	(0.02)	(–0.29)
INVENTORY	0.625	0.545	0.596	0.585	0.528
	(1.08)	(0.98)	(1.08)	(1.00)	(0.94)
LEV	0.107	0.154	0.111	0.163	0.118
	(0.18)	(0.27)	(0.20)	(0.28)	(0.21)
SIZE	–0.153**	–0.091	–0.114*	–0.132*	–0.119*
	(–2.18)	(–1.34)	(–1.70)	(–1.85)	(–1.77)
AGE	–0.031	–0.012	–0.053	–0.001	0.003
	(–0.19)	(–0.07)	(–0.32)	(–0.01)	(0.02)
DISTRESS	–0.072*	–0.068	–0.067	–0.072*	–0.070*
	(–1.69)	(–1.62)	(–1.59)	(–1.69)	(–1.67)
AUDITOR	–0.193	–0.207	–0.219	–0.155	–0.248
	(–0.69)	(–0.74)	(–0.78)	(–0.55)	(–0.89)
AUDITOR_RESIGNED	–0.029	–0.025	–0.047	–0.011	–0.028
	(–0.12)	(–0.10)	(–0.19)	(–0.04)	(–0.12)
TOPSHAREHOLDER	–0.010**	–0.010**	–0.010**	–0.010**	–0.009*
	(–2.04)	(–2.11)	(–2.04)	(–2.17)	(–1.94)
INSTITUTION	–0.286	–0.229	–0.277	–0.253	–0.246
	(–0.82)	(–0.66)	(–0.80)	(–0.72)	(–0.71)
DEMAND	0.007	–0.020	–0.003	–0.011	–0.001
	(0.05)	(–0.15)	(–0.02)	(–0.08)	(–0.01)
SOE	0.050	0.062	0.049	0.054	0.077
	(0.35)	(0.43)	(0.34)	(0.37)	(0.54)
YEAR	YES	YES	YES	YES	YES
INDUSTRY	YES	YES	YES	YES	YES
Constant	3.314*	2.361	2.248	3.443*	2.575
	(1.80)	(1.33)	(1.27)	(1.86)	(1.43)
Observations	1522	1522	1522	1522	1522
Pseudo *R*-squared	0.062	0.064	0.059	0.068	0.062

Note: This table reports the regression results for the effect of ICE quality on internal control quality. All of the variables are defined in Table 1. The figures in parentheses are robust *z*-statistics adjusted for heteroskedasticity.
* Significance at the 10 percent level (two-tailed test).
** Significance at the 5 percent level (two-tailed test).
*** Significance at the 1 percent level (two-tailed test).

Second, we add the interaction terms and perform the full sample regressions according to models 5 and 6. As shown in columns (3) and (6) of Table 5, the coefficients of *NUM* * *INST*, *EDU* * *INST* and *QUALITY* * *INST* are significantly negative. These results suggest that high institutional ownership alleviates the employee agency problem and improves the positive effect of ICE quality, thereby supporting H3.

5.4. Multivariate analysis of H4

We also examine whether managerial attention to internal control influences the effect of ICE quality on internal control quality. As explained above, when top managers attach great importance to internal control,

Table 4
Implementation of CSOX.

	(1) PRE *ICW*	(2) POST *ICW*	(3) ALL *ICW*	(4) PRE *ICW*	(5) POST *ICW*	(6) ALL *ICW*
NUM	0.014	–0.424***	0.023			
	(0.15)	(–3.22)	(0.32)			
EDU	–0.346	–1.029***	–0.480			
	(–0.95)	(–3.28)	(–1.17)			
CORPEXP	0.383	–0.154	0.283			
	(1.14)	(–0.51)	(1.08)			
*NUM * CSOX*			–0.470***			
			(–3.14)			
*EDU * CSOX*			–0.591**			
			(–2.29)			
*CORPEXP * CSOX*			–0.380			
			(–1.27)			
QUALITY				0.035	–0.347***	0.096
				(0.20)	(–2.84)	(0.59)
*QUALITY * CSOX*						–0.432**
						(–2.21)
CSOX			0.600			0.541*
			(1.60)			(1.66)
MA	–0.078	0.006	0.024	–0.110	0.030	0.010
	(–0.35)	(0.04)	(0.30)	(–0.59)	(0.22)	(0.07)
GROWTH	0.039	0.000	0.017	0.023	–0.056	–0.022
	(0.62)	(0.00)	(0.25)	(0.43)	(–0.65)	(–0.21)
INVENTORY	1.311	0.238	0.621	1.365	0.220	0.562
	(1.49)	(0.21)	(1.14)	(1.53)	(0.18)	(1.00)
LEV	–0.886	0.791*	0.310	–1.026	0.589	0.159
	(–1.11)	(1.78)	(0.67)	(–1.31)	(1.37)	(0.28)
SIZE	–0.212**	–0.142*	–0.157**	–0.216*	–0.100	–0.113*
	(–1.97)	(–1.69)	(–2.39)	(–1.93)	(–1.16)	(–1.67)
AGE	0.066	–0.030	0.005	0.113	–0.031	–0.018
	(0.35)	(–0.15)	(0.05)	(0.67)	(–0.16)	(–0.11)
DISTRESS	–0.101**	–0.053	–0.066**	–0.106**	–0.063*	–0.071*
	(–1.97)	(–1.45)	(–2.04)	(–2.00)	(–1.87)	(–1.68)
AUDITOR	–0.124	–0.272	–0.141	–0.273	–0.425	–0.273
	(–0.33)	(–0.89)	(–0.58)	(–0.99)	(–1.47)	(–0.97)
AUDITOR_RESIGNED	–0.152	0.103	–0.029	–0.168	0.131	–0.016
	(–0.47)	(0.48)	(–0.16)	(–0.50)	(0.63)	(–0.07)
TOPSHAREHOLDER	0.008	–0.020***	–0.011**	0.009	–0.018***	–0.009*
	(1.23)	(–4.38)	(–2.55)	(1.32)	(–3.91)	(–1.94)
INSTITUTION	–0.792	0.090	–0.339	–0.725	0.052	–0.287
	(–0.93)	(0.17)	(–0.71)	(–0.95)	(0.10)	(–0.83)
DEMAND	–0.139	0.085	–0.000	–0.114	0.081	0.002
	(–0.97)	(0.72)	(–0.00)	(–0.75)	(0.66)	(0.01)
SOE	0.491**	0.138	0.001	0.473**	0.216	0.081
	(2.28)	(0.69)	(0.01)	(2.29)	(1.12)	(0.47)
YEAR	YES	YES	YES	YES	YES	YES
INDUSTRY	YES	YES	YES	YES	YES	YES
Constant	6.422**	3.189	3.141*	6.225**	1.541	2.145
	(2.37)	(1.56)	(1.87)	(2.20)	(0.81)	(1.19)
Observations	533	989	1522	533	989	1522
Pseudo *R*-squared	0.129	0.093	0.081	0.125	0.081	0.065

Note: This table reports the regression results for whether the implementation of CSOX influences the effect of ICE quality on internal control quality. All of the variables are defined in Table 1. The figures in parentheses are robust *z*-statistics adjusted for heteroskedasticity.
* Significance at the 10 percent level (two-tailed test).
** Significance at the 5 percent level (two-tailed test).
*** Significance at the 1 percent level (two-tailed test).

Table 5
Monitoring of institutional investors.

	(1) LOW *ICW*	(2) HIGH *ICW*	(3) ALL *ICW*	(4) LOW *ICW*	(5) HIGH *ICW*	(6) ALL *ICW*
NUM	–0.112*	–0.582***	–0.109			
	(–1.67)	(–2.71)	(–1.57)			
EDU	–0.417	–1.947***	–0.472			
	(–1.24)	(–3.17)	(–1.26)			
CORPEXP	0.105	–0.392	0.014			
	(0.36)	(–0.88)	(0.04)			
*NUM * INST*			–0.453**			
			(–2.22)			
*EDU * INST*			–1.183*			
			(–1.81)			
*CORPEXP * INST*			–0.192			
			(–0.42)			
QUALITY				–0.081	–0.433***	–0.075
				(–0.44)	(–3.17)	(–0.46)
*QUALITY * INST*						–0.357**
						(–2.08)
INST			1.169			0.417
			(1.62)			(1.47)
MA	0.201	–0.408	–0.026	0.206**	–0.364	0.014
	(1.01)	(–1.34)	(–0.20)	(2.24)	(–1.30)	(0.16)
GROWTH	–0.042	–0.005	–0.091	–0.096	0.040	–0.067
	(–0.31)	(–0.03)	(–0.88)	(–0.92)	(0.45)	(–0.87)
INVENTORY	0.833	–0.072	0.565	0.736	–0.259	0.555
	(1.15)	(–0.05)	(0.82)	(1.24)	(–0.22)	(0.81)
LEV	0.535	–0.334	0.373	0.529	–0.401	0.197
	(0.78)	(–0.24)	(0.70)	(1.00)	(–0.34)	(0.42)
SIZE	–0.174*	–0.147	–0.132	–0.149	–0.109	–0.110
	(–1.84)	(–0.90)	(–1.60)	(–1.31)	(–0.70)	(–1.21)
AGE	–0.209	0.327	0.073	–0.200	0.329	0.072
	(–0.89)	(1.04)	(0.42)	(–1.03)	(1.59)	(0.53)
DISTRESS	–0.035	–0.177*	–0.059	–0.027	–0.182**	–0.066**
	(–0.64)	(–1.81)	(–1.32)	(–0.51)	(–2.38)	(–2.30)
AUDITOR	–0.123	–0.558	–0.193	–0.202	–0.770	–0.252
	(–0.32)	(–0.97)	(–0.76)	(–0.60)	(–1.63)	(–1.08)
AUDITOR_RESIGNED	0.185	–0.379	0.103	0.188	–0.430	–0.015
	(0.63)	(–0.73)	(0.34)	(0.61)	(–1.06)	(–0.07)
TOPSHAREHOLDER	–0.017***	–0.008	–0.012**	–0.017***	–0.004	–0.010**
	(–2.65)	(–0.77)	(–2.15)	(–2.75)	(–0.71)	(–2.31)
INSTITUTION	0.208	–0.370	0.002	0.224	–0.457	–0.062
	(0.40)	(–0.63)	(0.00)	(0.33)	(–0.65)	(–0.14)
DEMAND	–0.074	0.036	0.009	–0.072	0.039	0.007
	(–0.41)	(0.13)	(0.06)	(–0.30)	(0.15)	(0.06)
SOE	0.014	0.015	0.091	0.037	0.016	0.062
	(0.07)	(0.05)	(0.56)	(0.17)	(0.10)	(0.42)
YEAR	YES	YES	YES	YES	YES	YES
INDUSTRY	YES	YES	YES	YES	YES	YES
Constant	4.055*	5.210	2.893	3.066	2.869	1.888
	(1.66)	(1.24)	(1.47)	(1.12)	(0.77)	(0.98)
Observations	966	556	1522	966	556	1522
Pseudo *R*-squared	0.097	0.230	0.087	0.092	0.212	0.098

Note: This table reports the regression results for whether institutional ownership influences the effect of ICE quality on internal control quality. All of the variables are defined in Table 1. The figures in parentheses are robust *z*-statistics adjusted for heteroskedasticity.

* Significance at the 10 percent level (two-tailed test).

** Significance at the 5 percent level (two-tailed test).

*** Significance at the 1 percent level (two-tailed test).

Table 6
Managerial attention to internal control.

	(1) LOW *ICW*	(2) HIGH *ICW*	(3) ALL *ICW*	(4) LOW *ICW*	(5) HIGH *ICW*	(6) ALL *ICW*
NUM	0.002	–0.325***	–0.015			
	(0.02)	(–3.29)	(–0.18)			
EDU	–0.748**	–1.031***	–0.642			
	(–2.51)	(–2.84)	(–1.52)			
CORPEXP	0.440	–0.388	0.425			
	(1.28)	(–1.24)	(1.26)			
*NUM * DEMAND*			–0.261**			
			(–2.04)			
*EDU * DEMAND*			–0.231			
			(–0.43)			
*CORPEXP * DEMAND*			–0.718*			
			(–1.69)			
QUALITY				–0.019	–0.419***	0.017
				(–0.18)	(–3.51)	(0.11)
*QUALITY * DEMAND*						–0.347**
						(–2.12)
DEMAND			0.737			0.452
			(1.30)			(1.63)
MA	0.287*	–0.296	0.018	0.228	–0.258	0.018
	(1.96)	(–1.47)	(0.12)	(1.57)	(–1.29)	(0.14)
GROWTH	–0.015	–0.022	–0.010	–0.036	–0.060	–0.072
	(–0.13)	(–0.13)	(–0.09)	(–0.34)	(–0.39)	(–0.77)
INVENTORY	–0.220	1.747**	0.678	–0.208	1.362*	0.611
	(–0.34)	(2.09)	(1.14)	(–0.26)	(1.78)	(0.94)
LEV	–0.306	0.673	0.149	–0.375	0.639	0.264
	(–0.37)	(0.90)	(0.25)	(–0.46)	(0.90)	(0.51)
SIZE	–0.063	–0.199**	–0.128*	–0.100	–0.163*	–0.117
	(–0.87)	(–2.03)	(–1.78)	(–1.18)	(–1.74)	(–1.38)
AGE	–0.164	0.090	0.004	–0.123	0.068	0.079
	(–0.78)	(0.41)	(0.03)	(–0.63)	(0.33)	(0.41)
DISTRESS	–0.068	–0.059	–0.070	–0.076	–0.048	–0.062
	(–1.23)	(–1.05)	(–1.62)	(–1.37)	(–0.88)	(–1.41)
AUDITOR	–0.287	0.016	–0.174	–0.298	–0.126	–0.238
	(–0.69)	(0.05)	(–0.62)	(–0.70)	(–0.37)	(–0.96)
AUDITOR_RESIGNED	–0.054	0.110	–0.011	–0.061	0.069	–0.014
	(–0.19)	(0.34)	(–0.05)	(–0.20)	(0.21)	(–0.04)
TOPSHAREHOLDER	–0.011*	–0.013*	–0.011**	–0.010*	–0.012*	–0.010*
	(–1.86)	(–1.95)	(–2.27)	(–1.70)	(–1.73)	(–1.91)
INSTITUTION	–0.329	–0.102	–0.254	–0.348	–0.106	–0.053
	(–0.47)	(–0.21)	(–0.73)	(–0.49)	(–0.22)	(–0.10)
SOE	–0.248	0.390**	0.045	–0.201	0.416**	0.048
	(–1.10)	(1.98)	(0.31)	(–0.96)	(2.12)	(0.29)
YEAR	YES	YES	YES	YES	YES	YES
INDUSTRY	YES	YES	YES	YES	YES	YES
Constant	2.130	5.019**	2.930	2.587	3.231	1.832
	(1.03)	(2.06)	(1.54)	(1.17)	(1.37)	(0.88)
Observations	628	894	1522	628	894	1522
Pseudo *R*-squared	0.064	0.112	0.072	0.055	0.103	0.098

Note: This table reports the regression results for whether managerial attention influences the effect of ICE quality on internal control quality. All of the variables are defined in Table 1. The figures in parentheses are robust *z*-statistics adjusted for heteroskedasticity.

* Significance at the 10 percent level (two-tailed test).

** Significance at the 5 percent level (two-tailed test).

*** Significance at the 1 percent level (two-tailed test).

they devote more effort to ICE monitoring, which reduces the possibility of ICE shirking and increases the positive effect of ICE quality. Hence, we expect that the positive effect of ICE quality on internal control quality is more pronounced when top managers attach great importance to internal control.

To test this conjecture, we conduct two tests. The results are given in Table 6. First, we re-estimate models 1 and 2 separately on a sample of firms with less managerial attention to internal control (the "LOW" sample, i.e., $DEMAND = 0$) and a sample of firms with more managerial attention to internal control (the "HIGH" sample, i.e., $DEMAND = 1$). The results are reported in columns (1), (2), (4) and (5) of Table 6. Consistent with our expectation, only the coefficient of *EDU* is significantly negative when top managers pay less attention to internal control. In contrast, all of the coefficients of *NUM*, *EDU* and *QUALITY* are negative and significant at the 0.01 level when top managers pay more attention to internal control.

Second, we add the interaction terms and perform the full sample regressions according to models 7 and 8. As shown in columns (3) and (6) of Table 6, the coefficients of *NUM* * *DEMAND*, *CORPEXP* * *DEMAND* and *QUALITY* * *DEMAND* are significantly negative. These results suggest that high managerial attention alleviates the employee agency problem and improves the positive effect of ICE quality, thereby supporting H4.

6. Robustness tests

6.1. Alternative measure of internal control quality

Firms have an incentive to conceal internal control weaknesses, especially when they are domiciled in weak investor protection countries (Gong et al., 2013). Hence, to alleviate the influence of internal control weakness misreporting and ensure the validity of our results, we re-estimate our models using *ICW1* as an alternative measure of internal control quality. Specifically, following PCAOB Auditing Standard No. 5, we assume that the firms with operational irregularities or modified audit opinions have internal control weaknesses no matter

Table 7
Alternative measure of internal control quality.

	(1) *ICW1*	(2) *ICW1*	(3) *ICW1*	(4) *ICW1*
QUALITY	–0.127**	0.030	–0.032	0.033
	(–2.50)	(0.30)	(–0.32)	(0.27)
CSOX		0.331		
		(0.97)		
QUALITY * *CSOX*		–0.239**		
		(–2.28)		
INST			0.332	
			(1.25)	
QUALITY * *INST*			–0.306*	
			(–1.70)	
DEMAND				0.395
				(1.47)
QUALITY * *DEMAND*				–0.268*
				(–1.85)
Control variables	YES	YES	YES	YES
Observations	1522	1522	1522	1522
Pseudo *R*-squared	0.067	0.068	0.069	0.068

Note: This table reports the regression results for the effect of ICE quality on internal control quality and the influence of monitoring on this effect. *ICW1* is an indicator variable that is coded 1 if the firm discloses at least one internal control weakness, is punished for operational irregularities or receives a modified audit opinion in the given fiscal year, and 0 otherwise. Other variables are defined in Table 1. The figures in parentheses are robust *z*-statistics adjusted for heteroskedasticity.

*** Significance at the 1 percent level (two-tailed test).

* Significance at the 10 percent level (two-tailed test).

** Significance at the 5 percent level (two-tailed test).

whether they make disclosures. *ICW1* is an indicator variable that is coded 1 if the firm discloses at least one internal control weakness, is punished for operational irregularities or receives a modified audit opinion in the given fiscal year, and 0 otherwise.

The regression results are shown in Table 7. For the sake of brevity, we only report the results of the main variables. We find that the coefficients of *QUALITY*, *QUALITY* CSOX*, *QUALITY* INST* and *QUALITY* DEMAND* are significantly negative. These findings furnish additional support for all of our hypotheses. That is, ICE quality has a significant positive influence on internal control quality, and the positive effect is more pronounced for the firms in the strict monitoring environment, specifically for firms that have implemented CSOX, have higher institutional ownership, or attach great importance to internal control.

6.2. Endogeneity issue

Internal control quality influences the allocation efficiency of human capital, which, in turn, influences ICE quality. This reverse causality could induce an endogenous problem in our research. Therefore, we use a two-stage least squares (2SLS) regression method, adopting two instruments to alleviate the effect of endogeneity. In this subsection, we first introduce the instrumental variables constructed to capture ICE quality.

The provincial supply of internal control human resources is exogenous to the ICE quality of local firms but has no direct economic effect on firms' internal control quality (i.e., it is uncorrelated with the error term of the regression relating to firms' internal control quality). Thus, we choose the following two provincial variables as instruments to measure the human resource supply in the province where the firm is located: percentage of college graduates among the residents of the province (*BACHELOR*) and the per-capita gross domestic product of the province (*GDP*). In other words, it is easier for firms to hire qualified ICEs when they are located in provinces with a more highly educated population. Hence, we expect that *BACHELOR* is positively

Table 8
Endogeneity test: 2SLS regressions.

	(1) *QUALITY*	(2) *ICW*	(3) *ICW*	(4) *ICW*	(5) *ICW*
BACHELOR	0.010***				
	(2.63)				
GDP	0.035***				
	(4.54)				
QUALITY		–1.101***	0.010	0.309	0.754
		(–4.94)	(0.06)	(0.81)	(1.39)
CSOX			0.711		
			(1.56)		
QUALITY CSOX*			–0.562*		
			(–1.71)		
INST				1.003	
				(1.60)	
QUALITY INST*				–0.767*	
				(–1.67)	
DEMAND					1.442*
					(1.78)
QUALITY DEMAND*					–1.057*
					(–1.77)
Control variables	YES	YES	YES	YES	YES
Observations	1522	1522	1522	1522	1522

Note: This table reports the 2SLS regression results for the effect of ICE quality on internal control quality and the influence of monitoring on this effect. *BACHELOR* is equal to the percentage of college graduates among the residents of the province, and *GDP* is equal to the per-capita gross domestic product of the province. The other variables are defined in Table 1. The figures in parentheses are robust *z*-statistics adjusted for heteroskedasticity.

** Significance at the 5 percent level (two-tailed test).

* Significance at the 10 percent level (two-tailed test).

*** Significance at the 1 percent level (two-tailed test).

related to firms' ICE quality. Furthermore, higher per-capita gross domestic product also helps provinces to attract talented persons and therefore increases the provincial supply of internal control professionals. Therefore, we expect that *GDP* is to be positively related to firms' ICE quality. The data for *BACHELOR* and *GDP* are from the Chinese labor statistical yearbooks and the Chinese statistical yearbooks, respectively.

Table 8 presents the 2SLS regression results. For the sake of brevity, we only report the results of the main variables. As shown in column (1), consistent with our expectations, the coefficients of *BACHELOR* and *GDP* are positive and significant at the 0.01 level in the first stage regression. Furthermore, *BACHELOR* and *GDP* also pass the weak instrumental variable tests in the estimated 2SLS specifications. Columns (2)–(5) report the results from the second stage regressions. Consistent with our hypotheses, the coefficients of *QUALITY*, *QUALITY* * *CSOX*, *QUALITY* * *INST* and *QUALITY* * *DEMAND* are significantly negative. These findings furnish additional support for all of our hypotheses.

One might worry that the development level and human resource supply might vary greatly among cities in the same province, limiting the effectiveness of our instruments. Considering this, we only keep the firms that are located in the top two cities of each province and re-estimate the 2SLS regressions using the remaining 1033 observations. Untabulated results show that the coefficients of *QUALITY*, *QUALITY* * *CSOX*, *QUALITY* * *INST* and *QUALITY* * *DEMAND* are significantly negative, similar to the results reported in Table 8. Hence, we conclude that our findings are robust to an endogeneity bias.

6.3. Influence of chairman turnover

In Table 6, we assume that within a firm, the chairman's attitude toward internal control remains unchanged throughout the 2011 to 2013 period. However, if the chairman resigned during this period, the succeeding chairman might have a different attitude to internal control and therefore change the tone at the top.

Table 9
Robustness test: Excluding the effect of chairman turnover.

	(1) *ICW*	(2) *ICW*	(3) *ICW*	(4) *ICW*	(5) *ICW*	(6) *ICW*
NUM	0.067	–0.260***	0.023			
	(0.72)	(–3.72)	(0.27)			
EDU	–0.804	–0.282	–0.589			
	(–1.63)	(–0.57)	(–1.21)			
CORPEXP	0.817**	–0.319*	0.741*			
	(1.99)	(–1.73)	(1.94)			
NUM * *DEMAND*			–0.246*			
			(–1.86)			
EDU * *DEMAND*			0.343			
			(0.56)			
CORPEXP * *DEMAND*			–0.928*			
			(–1.94)			
QUALITY				0.111	–0.327**	0.137
				(0.69)	(–2.36)	(0.80)
QUALITY * *DEMAND*						–0.384**
						(–2.32)
DEMAND			0.412			0.487
			(0.63)			(1.58)
Control variables	YES	YES	YES	YES	YES	YES
Observations	521	729	1250	521	729	1250
Pseudo *R*-squared	0.081	0.098	0.071	0.064	0.106	0.064

Note: This table reports the regression results for whether managerial attention influences the effect of ICE quality on internal control quality. We estimate these regressions using the observations without chairman turnover. All of the variables are defined in Table 1. The figures in parentheses are robust *z*-statistics adjusted for heteroskedasticity.

* Significance at the 10 percent level (two-tailed test).

** Significance at the 5 percent level (two-tailed test).

*** Significance at the 1 percent level (two-tailed test).

Hence, to alleviate the influence of chairman turnover, we only keep the observations for firms without chairman turnover and re-estimate the regressions in Table 6. The new results are presented in Table 9. For the sake of brevity, we only report the results of the main variables. We find that the coefficients of $NUM * DEMAND$, $CORPEXP * DEMAND$ and $QUALITY * DEMAND$ are significantly negative, which provides additional support for H4. Hence, we conclude that our findings are robust to the influence of chairman turnover.

7. Conclusions

Our study examines the relationship between ICE quality and internal control quality, and the effect of monitoring on this relationship. Based on the input-process-output theory and agency theory, we argue that high quality ICEs increase the human capital investments in the design and implementation of internal control process, thus increasing internal control quality. Furthermore, effective monitoring can alleviate the agency problem between top managers and employees and further improve the positive effect of ICE quality on internal control quality.

Using special survey data from Chinese listed firms, we find that ICE quality has a significant positive influence on internal control quality, and this positive effect is more pronounced for firms in a strict monitoring environment. In particular, we find that the positive effect is more significant when firms implement CSOX, have higher institutional ownership, or attach great importance to internal control. Our results are robust to the misreporting problem of internal control weaknesses, endogeneity bias and chairman turnover.

Our research not only complements the literature on internal control and employee agency problem in theory, but also has important implications for practical corporate decisions on ICE allocation and monitoring. A fruitful extension of our research would be to investigate the paths and mechanisms through which ICEs influence internal control quality. Such analyses would help to develop a clearer picture of the functions of ICEs.

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