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journal homepage: [www.elsevier.com/locate/cjar](http://www.elsevier.com/locate/cjar)Audit mode change, corporate governance and audit effort<sup>☆</sup>Limei Cao<sup>a,\*</sup>, Wanfu Li<sup>b,\*</sup>, Limin Zhang<sup>c</sup><sup>a</sup> School of Accountancy, Guangdong University of Finance and Economics, China<sup>b</sup> School of Accounting, Nanjing University of Finance and Economics, China<sup>c</sup> Sun Yat-sen Business School, Sun Yat-sen University, China, School of Economics and Management, Beijing Jiaotong University, China

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## ABSTRACT

This study investigates changes in audit strategy in China following the introduction of risk-based auditing standards rather than an internal control-based audit mode. Specifically, we examine whether auditors are implementing the risk-based audit mode to evaluate corporate governance before distributing audit resources. The results show that under the internal control-based audit mode, the relationship between audit effort and corporate governance was weak. However, implementation of the risk-based mode required by the new auditing standards has significantly enhanced the relationship between audit effort and corporate governance. Since the change in audit mode, the Big Ten have demonstrated a significantly better grasp of governance risk and allocated their audit effort accordingly, relative to smaller firms. The empirical evidence indicates that auditors have adjusted their audit strategy to meet the regulations, risk-based auditing is being achieved to a degree, reasonable and effective corporate governance helps to optimize audit resource allocation, and smaller auditing firms in particular should urgently strengthen their risk-based auditing capability. Overall, our findings imply that the mandatory switch to risk-based auditing has optimized audit effort in China.

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## 1. Introduction

The information asymmetry between a principal (shareholder) and agent (management) may lead to adverse selection and moral hazard. When an enterprise constitutes a series of linked contracts (Jensen and Meckling, 1976), managers are motivated to manipulate accounting policies and accounting choices to meet contract demands (Dechow et al., 2010). The question is how to effectively alleviate and control such managerial behavior. Theoretically, effective and reasonable internal controls can suppress management's manipulation of financial information to some extent because one of the functions of internal controls is to provide reasonable assurance of the reliability of financial reporting. Of course, auditing is also an external mechanism designed to mitigate agency problems, and, when applied using the internal control-based audit mode, the auditor must thoroughly understand the internal controls related to the financial statements in question to be able to identify material misstatements by the company.

Unfortunately, the frequent cases of financial and management fraud and false accounting information seen in recent years have raised awareness that internal controls are not effective in preventing these practices (Cao and Qian, 2011). Internal controls fail to reduce audit risk to an acceptable level because corporate governance is the main factor in audit risk, with effective controls depending on the rationality of corporate governance mechanisms. Reflective and reasonable corporate governance mechanisms are effective in mitigating and controlling the manipulation of financial information and adverse selection by management. Regular and effective mechanisms can also monitor, motivate and evaluate management, thereby reducing the probability of managers failing to meet their contractual obligations (and thus manipulating financial information) and increasing the reliability of that information.

As a key principle, the financial reporting and behavior of auditors is directly related to the reliability of accounting information (Watts and Zimmerman, 1983). External auditing, as an important part of external monitoring, provides reasonable assurance that financial reporting is fair and lawful in all material respects (Choi and Wong, 2007). Effective corporate governance can provide reasonable assurance of the quality of financial information and reduce audit risk, thus influencing auditor resources and effort. The revised auditing standards introduced by the U.S. Sarbanes–Oxley Act require the implementation of risk-based auditing, necessitating that auditors become thoroughly familiar with corporate governance mechanisms. The new audit guidelines implemented in China from 1 January 2007 also require such familiarity of auditors to enable them to assess the risk of material misstatements and configure their auditing efforts accordingly.

Because the audit mode in China did not change as a spontaneous response of auditors to fraud risk, but rather was mandated by the government, this study investigates whether auditors have actually changed to the risk-based mode and now evaluate corporate governance before they configure their audit effort. The results show that under the old regulations, when auditors applied the internal control-based audit mode, the relationship between audit effort and corporate governance was weak. Since implementation of the new risk-based mode required by the new auditing standards, that relationship has become significantly stronger. Further analysis reveals that the Big Ten auditing firms have demonstrated a significantly better grasp of governance risk, and allocate their auditing resources accordingly, in the wake of the changes relative to their smaller counterparts. The empirical evidence suggests that the higher the degree of corporate governance in a firm, the greater the assurance of its financial statements, which can save audit effort. Our findings also indicate that auditors have adjusted their audit strategies to meet the new regulations, that risk-based auditing is being achieved to a certain degree, that reasonable and effective corporate governance helps to optimize audit resource allocation and that smaller auditing firms, in particular, need to strengthen their risk-based auditing capability as a matter of urgency. In sum, the risk-based audit mode has helped considerably to optimize auditing effort in China.

The main contributions of this study are as follows. First, audit quality refers to the joint probability of an auditor finding and reporting a client's material misstatements. Appropriate audit effort is not only important to the auditor fulfilling the audit contract, but also to the allocation of infrastructure to identify material misstatements. Despite the requirement for auditors to report such misstatements, research in this area is rare in China, and this study thus provides important empirical evidence.

Second, regarding the regulatory change in audit mode, this study is the first to examine the relationship between corporate governance and audit effort. It confirms the positive role of the risk-oriented audit mode in linking audit effort to corporate governance mechanisms, thus enriching the literature on auditing standards, auditing theory and corporate governance, and serving as a reference for policymakers in setting accounting policy.

Third, this study provides an empirical evidence to show that China's auditors have adjusted their audit strategies in accordance with the 2007 regulations. Despite much discussion of the risk-based audit mode, empirical knowledge of its use is scarce. Hence, this study's examination of its application in practice is of great significance in helping practitioners to understand the mode's importance.

The remainder of this paper is organized as follows. Section 2 presents the literature review. Section 3 provides the study's institutional background, theoretical analysis and hypotheses. The study design is set out in Section 4 and the results of the empirical analysis in Section 5. Conclusions are drawn in Section 6.

## 2. Literature review

There is an important practical and academic value in identifying and configuring the main risks affecting audit effort to reduce audit risk and improve audit efficiency and effectiveness. Simunic (1980) views audit risk as a loss in present value to third parties due to audited financial reports, and argues that investment in auditing resources reduces that risk. Houston et al. (1999) expand Simunic's (1980) definition of audit risk, viewing it as comprising of two parts: undiscovered material misstatements and immaterial (irrelevant) misstatements. They suggest that an auditor should first assess the business risk and then determine his or her audit effort in accordance with it. Although Houston et al. (1999) propose that audit effort be based on business risk, they offer no clear definition of what constitutes business risk. Empirical research carried out by O'Keefe et al. (1994) to characterize business risk shows that audit effort is significantly affected by firm size, complexity, debt risk, internal control risk and firm listing status. With advances in practical and academic research, subsequent studies have expanded the definition of business risk to include corporate governance. Bedard and Johnstone (2004) studies corporate governance risk, earnings management and audit effort pricing, and finds that a company's earnings management risk and governance risk increase with the rate of increase in an auditor's hourly wage. The evidence from the aforementioned overseas studies suggests that understanding of the business risk arising from audit risk has shifted from a vague understanding of specific risks to an understanding of internal control risk, and then expanded to encompass corporate governance risk.

Although researchers have investigated the corporate governance and auditing practices of China's main listed firms in the areas of audit quality, audit opinions, audit fees, information disclosure and internal governance, none to date has examined audit modes or audit effort in relation to corporate governance. This study differs from overseas research in the following ways. First, it uses data from companies listed in China. Relatively few studies have examined audit effort in developing countries, primarily because of limited data availability. Those that have been carried out are generally based on small samples and use questionnaire data from a single auditing firm or from clients audited by one of the Big Four. In contrast, the data used in this study cover the entire A-share market, and are thus widely applicable. Second, the corporate governance index used in this study is more comprehensive and objective than that used in Bedard and Johnstone (2004). As China's corporate governance mechanisms differ from those of other countries, this study not only enriches the global literature on audit effort and risk-based auditing, but also provides evidence to support the regulation of the auditing market. Third, its focus on China's change to risk-based auditing and the link between corporate governance and audit effort, an area of interest since the work of Bedard and Johnstone (2004), enriches audit theory and the theory of auditing standards.

## 3. System background, theoretical analysis and hypotheses

### 3.1. Institutional audit mode change

Traditional audit theory views independent auditing as necessary because of the separation between ownership and management rights. Its ultimate goal is to reduce the agency problem, capital market information

asymmetry and transaction costs while increasing the efficiency of resource allocation (Wallace, 1987). To achieve these objectives, auditors have to adopt a particular audit mode, or methodology, during the audit. However, with economic development and changes in the auditing environment, the prevailing audit mode has required a change.

Until the late 1930s, audit procedures were central to the formulation of U.S. auditing standards, the main goal being troubleshooting using a variety of measures. This early auditing mode was characterized by detailed accounts auditing without risk sampling, and audit effort was applied according to the volume of business accounts and business complexity. From the 1930s to the late-1970s, along with economic development, growing business sizes, the expansion of transactions and the increased complexity of internal management, company accounting became more complex, and the use of a variety of troubleshooting measures became uneconomical. Because management was responsible for financial reports, there was a close relationship between internal control and the quality of financial information. Changes also occurred in the audit mode in this period, with the application of sampling techniques adopted and a greater need for practitioners to understand business risk. The earlier detailed audit mode thus shifted to an internal control-based mode that required the auditor to understand the internal controls relevant to a firm's financial statements, and then estimate the risk of material misstatements in accordance with the design of the firm's internal controls, for example, whether they were operational, and finally allocate resources and determine the nature and scope of the audit based on that risk.

Despite the influence of laws and regulations on audit demand and supply, subsequent prominent cases of management fraud litigation and audit failures led auditors to realize that assessing the relevance of financial statements and internal controls was insufficient to effectively prevent and reduce audit risk, as management has an incentive to manipulate accounting policies and choose self-seeking options. However, the degree of such manipulation depends on the corporate governance mechanisms in place. Reasonable and effective corporate governance arrangements serve to constrain and incentivize management effectively, thereby reducing the likelihood of the company's financial information being manipulated. It was in this context that the risk-based audit mode emerged. Risk-based auditing requires the auditor to assess a company's internal controls and accounting books, estimate the likelihood of a material misstatement based on the company's corporate governance mechanisms, and then determine the audit scope, priorities and effort required accordingly.

The risk-based audit mode, which is an improved version of the traditional internal control-based mode, was an inevitable development (Wang and Wu, 2005) in helping to analyze and discover material misstatements. The risk-based audit system in the United States developed gradually from the late-1970s to the 1990s. In 1983, the U.S. General Accounting Standards Board (GASB) issued its Statement on Auditing Standards No. 47, covering audit risk and importance, followed by further audit guidelines. As the U.S. risk-based mode matured, the International Auditing and Assurance Standards Board (IAASB) began to study and learn from the United States. In 2000, the IAASB and GASB established a joint risk analysis group, which concluded that the new method could improve audit effectiveness. The serious economic consequences of the Enron scandal led the IAASB to accelerate the introduction of risk-based auditing. In October 2003, it issued International Standard on Auditing ISA 315 entitled "Identifying and assessing the risks of material misstatement through understanding the entity and its environment" and ISA 330, "The auditor's responses to assessed risks," which emphasized the importance of auditor familiarity with the corporate governance of clients.

### *3.2. Audit mode change in China*

To align with international practice, in February 2006 China's Ministry of Finance issued new audit practice guidelines that came into effect on 1 January 2007. The new standards require auditors to implement the risk-based audit mode and familiarize themselves with clients' corporate governance mechanisms to be able to identify and assess the risk of material misstatements in financial statements before determining the appropriate audit nature, timeframe and effort.

Before 2007, China's auditing standards were internal control-based and auditors assessed audit risk by evaluating the internal controls on financial reporting. Provided that auditors acted in accordance with the standards of practice, were familiar with the internal controls related to financial statements and collected

appropriate evidence to prove that they had followed the auditing standards, they could avoid any corresponding legal and regulatory responsibility even if audit failure or management fraud was subsequently uncovered. However, in 2007, regulators implemented revised auditing standards to meet the requirements of China's economic development and secure convergence with international auditing practices.

The old and new auditing standards differ significantly. First, the new standards require reasonable assurance from auditors that financial statements are free of material misstatements on the whole, regardless of whether such misstatements are the result of fraud or error (Auditing Standards No. 1141, 16). This requirement increases the auditor's liability and risk. Second, because of the risk that corporate governance is the source of audit risk, the new auditing standards require auditors to understand and evaluate a client's corporate governance practices and environment, and thereby identifying and assessing the risk of material misstatements as a basis for determining audit effort, procedures and scope. Third, because the new auditing standards increase auditor responsibility in cases of fraud, and because the degree and effectiveness of corporate governance is a fundamental cause of concentrated business risk, auditors are required to use the risk-based audit mode when auditing listed companies.

As China's revised auditing standards were introduced as a mandatory change, not in response to audit failure and fraud risk, and to adapt to the country's market economy and allow convergence with international auditing practices, the increased legal liability and risk for auditors have forced them to pay attention to and evaluate corporate governance to reduce audit risk.

### 3.3. *Theoretical analysis and hypotheses*

A major objective of internal control is to ensure that financial information is reliable and effective. A range of business control activities such as authorization requirements, separation of incompatible duties, systematic accounting, property protection and budget controls helps to detect unintentional errors within a company contract (Ashbaugh-Skaife et al., 2008; Doyle et al., 2007), internal control deficiencies and poor-quality financial information (Doyle et al., 2007). Effective internal controls can also improve the quality of earnings. Auditing is a significant external governance mechanism that helps to explicate the internal control of financial statements and establish the risk of material misstatements by enterprises.

However, as internal control mechanisms are affected by corporate governance, the supervision and encouragement of corporate governance are important to ensure the effective operation of those mechanisms. According to agency theory, one of the purposes of corporate governance is to guarantee the effective operation of financial controls in the following ways. First, management directly supervises daily financial controls through its internal control activities and takes responsibility for the veracity and reliability of financial information. Second, corporate governance supervises management's financial control activities, as the board and audit committee are required to monitor the reliability of its financial reporting (Beasley et al., 1997; Johnstone et al., 2001). The lack of an audit committee (Dechow et al., 1996; McMullen, 1996) and a small proportion of independent directors and audit committee members on the board both increase the likelihood of false financial reports (Beasley, 1996; Abbott et al., 2000; Beasley et al., 2000). Studies have shown internal controls to be weak and ineffective in monitoring management when the above corporate governance measures are absent or defective. Because efficient corporate governance is able to control and reduce a company's agency problem, it has the ability to evaluate, inspire and motivate management, which can effectively prevent the manipulation of financial information and fraud (Cai, 2007).

Compared with the internal control-based audit mode, the risk-based mode, if implemented effectively, can identify risks more scientifically, assess the risk of material misstatements more rationally, and thus determine the key risk areas and appropriate audit effort more accurately. To reduce the level of audit risk, auditors need to increase their effort in key areas and reduce their effort in non-priority areas, rendering the overall audit effort allocation more rational, saving overall effort and improving the efficiency of resource allocation.

However, the change in audit method in China occurred for reasons of socioeconomic development and international convergence. The risk-based audit method did not arise as a spontaneous response to audit risk, but rather through government decree. Due to the consequent change in liability and the requirement for auditors to have a thorough understanding and assessment of corporate governance, auditors who fail to examine a material misstatement that is related to governance bear legal responsibility for that misstatement.

To meet the new regulatory requirements and reduce their legal and regulatory risks, auditors must apply the new audit mode to evaluate corporate governance, leading to a change in audit effort. The literature shows that in 1994, after detailed standards were issued for non-standard audit opinions in response to a regulatory requirement to reduce audit risk, auditors exhibited a significant increase in non-standard audit opinions (e.g., DeFond et al., 2000).

Based on the above analysis and discussion, we hypothesize that before implementation of the new audit practice guidelines in China, auditors complied with the old internal control-based auditing standards and tended to lack motivation, or the necessary guidance, to evaluate corporate governance. Thus, the correlation between corporate governance and audit resources was weak in that period.

After implementation of the new audit practice guidelines, auditors had to adjust their audit strategy to meet regulatory requirements, and thus became concerned with the assessment of governance-related factors, leading to a change in audit effort. The change also led to more effective corporate governance, which reduced the risk of material misstatements and was more conducive to saving audit effort. Accordingly, we propose the following hypothesis.

**Hypothesis 1.** Since the change to the risk-based audit mode in China, the negative correlation between corporate governance and audit effort has been significantly enhanced.

Independent auditing is an important aspect of external oversight, and is carried out by allocating audit effort. According to DeAngelo (1981), audit quality refers to the joint probability of a material misstatement in a client's financial statements being found and reported by the auditor and the auditor's ability to detect such a misstatement due to professional competence, including audit experience, audit mode (method) and audit effort.

Although the risk-based audit mode requires auditors to gain competence in identifying the risk of material misstatements, and then to decide the audit scope, procedure and effort accordingly, auditing firms of different size have differing levels of ability to implement that mode and evaluate corporate governance risk. First, large audit firms have more extensive experience and more talented staff, and can thus more quickly grasp and apply the risk-based audit mode and assess corporate governance risk, and their allocation of audit effort is thus more competitive than that of smaller audit firms. Second, unlike smaller firms, the international Big Four and the larger domestic auditing firms were actively involved in drafting the new auditing standards (Pan, 2008). Hence, the Big Ten – the 10 largest audit firms in the American Institute of CPAs' (AICPA's) top 100 firms – were exposed to the risk-based audit mode and the theory behind it earlier than their smaller counterparts, and they may thus have greater mastery of the new system and be more sensitive to corporate governance risk and better able to adjust their audit effort accordingly. Based on the above analysis, we propose the following hypothesis.

**Hypothesis 2.** Since China's change to the risk-based audit mode, the Big Ten have demonstrated a significantly better grasp of governance risk and audit effort than smaller firms.

## 4. Study design

### 4.1. Sample data

The implementation of the new practice guidelines marked the standardization of the risk-based audit mode in China. Taking 2007 as the starting point of institutional change, we select a sample of the listed companies from 2004 to 2011. Audit effort data come from the China Association of Certified Public Accountants, and include auditor tenure, auditor conversion from manual risk-based collation and other data from the GTA database. The sample is filtered by the following criteria: (1) excluding financial companies; (2) excluding ST and PT companies; (3) excluding observations with missing financial and corporate governance information; and (4) winsorizing the main continuous variables at the 1% level to eliminate the effect of outlying values. The sample selection process is illustrated in Table 1.

Table 1  
Sample selection.

Sample selection	Total sample	Before audit mode change	After audit mode change
Initial sample	11,844	3332	8512
Financial sector (-)	317	52	265
ST and PT companies (-)	1044	294	750
Missing financial data (-)	1997	744	1253
Final sample	8486	2242	6244

#### 4.2. Model set and variable definitions

According to the above theoretical analysis, and with reference to [Bedard and Johnstone \(2004\)](#), we construct the following regression model to test our hypotheses.

$$\begin{aligned} \text{Effort} = & \beta_0 + \beta_1 \text{Gov} + \beta_2 \text{After} + \beta_3 \text{Gov}^* \text{After} + \beta_4 \text{Big10} + \beta_5 \text{Tenure} + \beta_6 \text{Switch} + \beta_7 \text{Size} \\ & + \beta_8 \text{Debt} + \beta_9 \text{Loss} + \beta_{10} \text{Growth} + \beta_{11} \text{Cro\_list} + \beta_{12} \text{Rec\_inv} + \beta_{13} \text{Liquidity} + \beta_{14} \text{RPT} \\ & + \beta_{15} \text{Opinion\_1} + \beta_{16} \text{Punish\_1} + \beta_{17} \text{Fee} + \beta_{18} \text{Marketindex} + \beta_{19} \text{Year} + \beta_{20} \text{Industry} + \mu \quad (1) \end{aligned}$$

In Model (1), the interaction term between corporate governance and a change in audit mode,  $\text{Gov}^* \text{After}$ , is expected to have a negative coefficient.

To test [Hypothesis 2](#), we construct Model (2) based on Model (1). In this model, the interaction term,  $\text{Gov}^* \text{Big10}^1$ , examines whether the Big Ten are significantly different from smaller firms in their grasp of corporate governance risk and application of audit effort following the change in audit mode. We expect the coefficient of  $\text{Gov}^* \text{Big10}$  to be negative.

$$\begin{aligned} \text{Effort} = & \beta_0 + \beta_1 \text{Gov} + \beta_2 \text{Big10} + \beta_3 \text{Gov}^* \text{Big10} + \beta_4 \text{Tenure} + \beta_5 \text{Switch} + \beta_6 \text{Size} + \beta_7 \text{Debt} \\ & + \beta_8 \text{Loss} + \beta_9 \text{Growth} + \beta_{10} \text{Cro\_list} + \beta_{11} \text{Rec\_inv} + \beta_{12} \text{Liquidity} + \beta_{13} \text{RPT} \\ & + \beta_{14} \text{Opinion\_1} + \beta_{15} \text{Punish\_1} + \beta_{16} \text{Fee} + \beta_{17} \text{Marketindex} + \beta_{18} \text{Year} + \beta_{19} \text{Industry} + \mu \quad (2) \end{aligned}$$

The main model variables and control variables are defined as follows.

##### 4.2.1. Audit effort

The literature defines audit effort as the number of days spent by the audit team (e.g., [Caramanis and Lennox, 2008](#); [Palmrose, 1984](#); [Davidson and Gist, 1996](#)). Audit days refer to the number of days taken to complete the entire audit process, including audit planning, fieldwork and review. The research data in most overseas work in this area are obtained through questionnaires covering the entire audit process. Audit effort in this study is defined as the log of the product of the number of audit fieldwork days and audit team size. We use fieldwork days rather than the time taken to complete the entire audit process because fieldwork is a core part of an independent audit, a key component of audit effort and a key step in constraining management, and is thus a representative of overall audit effort.

##### 4.2.2. Corporate governance

Corporate governance is an important mechanism for alleviating the agency problem, its core purpose being to encourage internal employees to act in accordance with the interests of shareholders, and constrain them from doing otherwise. Governance research covers the early stages of corporate governance through analysis of specific corporate governance mechanisms, including ownership structures, boards of directors, management incentives and other features. In this study, we construct a corporate governance index as a measure of the overall quality of corporate governance ([Gompers et al., 2003](#); [Bai et al., 2005](#); [Li and Zhang, 2005](#); [Liao et al., 2008](#); [Zhang and Liao, 2010](#)). We follow [Bai et al. \(2005\)](#) and [Zhang and Liao \(2010\)](#) in using

<sup>1</sup> The test sample for [Hypothesis 2](#) includes only data from the period after the audit mode change, and thus cross-multiplication is not included for the variable *After*.

Table 2  
Corporate governance index.

Governance indicator	Variable	Explanation
Shareholding structure and shareholder equity	Largest shareholder ownership	Percentage ownership of the largest shareholder
	Shareholder concentration	Total shareholding of the second largest to the tenth largest shareholder divided by the shareholding of the largest shareholder
	Proportion of state-owned shares	State-owned shares divided by total shares
	Proportion of board shareholding	Proportion of shares held by the board
	Proportion of supervisory committee shareholding	Proportion of shares held by the supervisory committee
Management governance	Managerial ownership CEO duality	Proportion of shares held by the management Chairman and CEO in part-time roles
Directors, supervisors, and other forms of governance	Board size	Number of board directors
	Proportion of independent directors	Number of independent directors divided by the number of board directors
	Board meeting frequency	Number of meetings of the board of directors
	Supervisory board meeting frequency	Number of supervisory board meetings
	Number of committees	Number of committees established, such as audit committee and remuneration committee

principal component analysis (PCA) to find a linear combination of all indicators to define the corporate governance index (Gov), combining a few of the top principal components from PCA. The construction of our corporate governance index is shown in Table 2, and the factor loading table and discussion of PCA are provided in the Appendix.

#### 4.2.3. Big Ten

Big Ten (Big10) refer to the 10 largest audit firms in the AICPA's top 100 firms. DeAngelo (1981) considers large audit firms that obtain long-term quasi-rents to be more independent than smaller firms, and they should thus be more active in exerting adequate audit effort to reduce earnings management and control audit risk (Caramanis and Lennox, 2008). In China, however, much research has confirmed that the audit quality of neither the large domestic audit firms nor the international Big Four is high. Given the country's lack of demand for high-quality auditing, large audit firms have little motivation to invest in the effort needed to provide such auditing, and the expected sign on Big10 is thus uncertain.

#### 4.2.4. Control variables

With reference to Bedard and Johnstone (2004) and other studies, and in consideration of China's special institutional background, we select the following control variables to control for other factors that may affect audit effort.

When auditor tenure (Tenure) is longer, auditors are more familiar with the client's corporate governance and financial situation, and the degree of information asymmetry is lower than with new clients, which should help to conserve audit effort. Nevertheless, despite the theoretical expectations of this study, Caramanis and Lennox (2008) find auditor tenure to be positively correlated with audit effort. Hence, we do not predict the sign between Tenure and audit effort.

A change in auditor (Switch) increases the information asymmetry between auditors and clients. The successive auditor needs more time to understand and become familiar with the client and to carefully assess the risk of a material misstatement to correlate it with audit effort. However, according to DeAngelo's (1981) theory of quasi-rents, auditors usually attract clients with low prices initially. In China, an auditor's ability to obtain future quasi-rents is uncertain, as the audit division is likely to reduce the necessary audit effort after



the first audit. Because of the differing circumstances of individual audit firms, the expected sign on Switch is uncertain.

The larger the company (Size), the more audit effort needed (O'Keefe et al., 1994; Palmrose, 1989). A positive association is thus expected between company size and audit effort.

The asset-liability ratio (Debt) reflects the ability of companies to repay their loans. The higher the ratio, the greater both the debt risk and audit risk (O'Keefe et al., 1994). A positive association between Debt and audit effort is thus expected.

O'Keefe et al. (1994) claim that when an audited client is operating at a loss, auditors need to pay special attention to the business risk and be aware of the potential for business failure or shareholder litigation arising from the discontinuation of operations. In addition, the management of such a company may have a strong incentive to engage in a "whitewash," meaning that auditors would be wise to increase their audit effort to control audit risk. We thus expect operating loss (Loss) to be positively associated with audit effort.

As company growth (Growth) is directly related to a company's future profitability and ability to expand production, we expect it to be negatively correlated with audit effort (O'Keefe et al., 1994).

When domestic listed companies are also listed overseas (Cro\_list), the various financial reporting requirements in the overseas jurisdictions can affect the quality of their data (Ball et al., 2000), a possibility that needs to be taken into account with regard to investment in audit effort if a cross-listed company's financial reporting and audit reports are intended for both domestic and overseas use. Hence, we expect a positive association between Cro\_list and audit effort.

The inventory-accounts receivable ratio (Rec\_inv) is used to measure the complexity of a client's business, with greater complexity requiring more audit effort. We thus expect it to have a positive association with audit effort.

The current ratio (Liquidity) reflects a company's ability to use corporate cash to repay short-term borrowings. The higher the current ratio, the lower both the debt and audit risk. Hence, we expect Liquidity to have a negative relationship with audit effort.

Related party loans (RPT) represent the proportion of company debt comprising direct or indirect debt. Loans from related parties reduce transaction costs, optimize capital structure and improve capital utilization. However, they are also associated with the way in which related parties or major shareholders take up company funds. As the circumstances differ for different companies, the expected sign is uncertain.

Prior year audit opinion (Opinion\_1) represents a non-standard audit opinion, indicating that the previous annual financial statements contained a material misstatement or did not reflect fair value in some significant respect. To reduce audit risk, auditors need to invest greater audit effort. Hence, we expect that effort to have a positive association with Opinion\_1.

If a client was punished (Punish\_1) by the regulatory authorities for the quality of its financial information in the previous year, we predict that both audit risk and regulatory risk are high, and auditors need to be more prudent. Thus, we expect a positive association between audit effort and Punish\_1.

Palmrose (1989) considers the audit contract fee (Fee) to have two models: fixed cost and cost plus. Fixed costs are often ascertained before the initial audit, and remain unchanged over a given period (often several years), whereas the cost-plus model is generally based on audit effort, and is usually determined at the end of the audit. We speculate that a fixed-cost contract is likely to be an important variable in investment in audit effort, whereas a cost-plus contract is unlikely to exert any influence. Because of the two types of fee contracts, "low-balling" has some effect on audit effort. DeAngelo (1981) claims that low-balling does not harm auditor independence because auditor switching has transaction costs, and auditors can thus recover their initial pricing discount through future audits. However, in 1998, the China Securities Regulatory Commission stated that low-balling and the payment of kickbacks or commissions greatly reduce an audit firm's profit margin, leading some firms to reduce their audit effort considerably (China Securities Regulatory Commission, 1998). In summary, the expected sign of the relationship between audit fee and audit effort is uncertain.

Market process (Marketindex) refers to the level of economic development in a region or area. The more economically developed the region/area, the better the legal environment it enjoys and the greater the regulatory and litigation risks for auditors. A positive association between Marketindex and audit effort is thus expected.

Finally, we also control for industry and year effects. All of the variables used in the models are defined in Table 3.

## 5. Empirical testing

### 5.1. Descriptive statistics

Table 4 presents the descriptive statistics for all of the variables. The average audit effort is 5.6, indicating that auditors devote some effort to searching for material misstatements to fulfill their contractual obligations. The maximum corporate governance index value is 10.77, the minimum is  $-1.52$  and the mean is  $-0.06$ , with the standard deviation of 0.6 indicating significant differences across companies.

Table 5 reports the mean and median differences in the main and control variables before and after the audit mode change. The majority of the variables exhibit significant differences after the change. For example, the mean and median for corporate governance (Gov) shift from negative to positive, significant at the 1% level, indicating improvement in the extent of sound and effective corporate governance in the post-change period. In addition, the results in Table 5 also indicate the need to control for these factors in relation to audit effort.

### 5.2. Empirical results and analysis

Table 6 reports the testing of Hypothesis 1. The coefficient for the main effect of Gov is 0.109, and the coefficient for the interaction term, Gov\*After, is  $-0.277$  ( $T$  value =  $-4.98$ ), significant at the 1% level, suggesting that better corporate governance did not save audit effort before the mode change, but reduced it significantly after it. Keeping other factors constant, a one unit increase in the corporate governance index is associated with a reduction in the number of field days by 18.3%. Regarding economic significance, marginal effect analysis shows that after the audit mode change (i.e., After = 1), a corporate governance index increase from the 25th to the 50th percentile ( $-0.43$  to  $-0.13$ ) is equal to a reduction of 26 days (equivalent to a 10.4% median change) in audit effort. Thus, these findings are both statistically and economically significant. Overall, when auditor decision-making considers internal controls alone to be relevant to financial statements, investment in audit effort does not reflect corporate governance risk, whereas risk-based auditing encourages auditors to consider corporate governance factors more fully. The regression results in Table 6 support Hypothesis 1, and show that the objectives of the risk-based audit mode have been fulfilled to a certain extent.

Table 7 reports the test results for Hypothesis 2. The coefficients for Gov\*Big10 are significant at the 1% level ( $T = -4.93$ ), supporting the hypothesis that the Big Ten are better able than their smaller counterparts to recognize improved corporate governance and adjust their audit effort accordingly. This result also indicates that the risk-based audit mode improves practice and risk control to some extent. It also implies that smaller firms need to strengthen their grasp of risk-based auditing and that the Chinese Institute of CPAs needs to improve its supervision and inspection regime and apply more effective controls to ensure that small firms implement the risk-based mode.

To seek further evidence for Hypothesis 2, we also test the sample in the period before implementation of the new auditing standards. As shown in Table 8, a positive but not significant relationship is found between corporate governance and audit effort, but the regression results are inconsistent with those after the audit mode change. The coefficient of Gov\*Big10 is positive but not significant, and does not match the assumption, providing further evidence for Hypothesis 2.

### 5.3. Robustness tests

#### 5.3.1. Addition and deletion of transition sample

The foregoing tests used 2007 as the start of the research window, but it is possible that auditors may already have been affected by the new auditing standards in 2006. We thus also test fiscal year 2006 as the date of the change in auditing practice, but our conclusions remain unchanged. The results also remain unchanged when we remove 2006 from the sample. (The results of these tests are not reported due to space limitations.)

Table 3  
Variable definitions.

Variable type	Variable	Variable description
Dependent	Effort	Log of the product of audit fieldwork days and audit team size
Independent	Gov	Calculated using principal component analysis
	Gov_1	Log of Gov
	After	Dummy, assigned 1 when fiscal year is 2007 or later; otherwise 0
	Big10	Dummy, assigned 1 when audit firm was assessed as being in the top 10 by the AICPA; otherwise 0
Control	Tenure	Number of years of continuous auditing
	Switch	Dummy, assigned 1 when auditor has changed; otherwise 0
	Size	Natural log of total assets at year end
	Debt	Total liabilities/total assets
	Loss	Dummy, assigned 1 when business profit is negative; otherwise 0
	Growth	Growth rate of main business revenue (rate of change)
	Cro_list	Dummy, assigned 1 when company is cross-listed; otherwise 0
	Rec_inv	(Accounts receivable + inventory)/total assets at start of year
	Liquidity	Current assets/current liabilities
	RPT	Proportion of liabilities accounted for by related party loans
	Opinion_1	Dummy, assigned 1 when audit opinion is unqualified; otherwise 0
	Punish_1	Dummy, assigned 1 when subject to regulatory penalty <sup>a</sup> ; otherwise 0
	Fee	Log of audit fee
	Marketindex	Refer to Annual Report of China Market Index: Relative Process in 2011 (Fan and Wang, 2011), the marketization index
	Lawindex	Refer to Annual Report of China Market Index: Relative Process in 2011 (Fan and Wang, 2011), the legal environment index
Year	Year dummy variables	
Industry	Industry dummy variables	

<sup>a</sup> The decision-making body includes the Punishment Commission, Ministry of Finance and stock exchange. Punishment results when a listed company's financial reports or financial information violate China's securities law, stock listing rules, enterprise accounting standards, various requirements regarding external guarantees and funds between related parties or other relevant laws and regulations.

Table 4  
Descriptive statistics.

Variable	Sample	Mean	Stdev	Min	Max
Effort	8486	5.6	1.2	0.69	11.68
Gov	8486	-0.06	0.6	-1.52	10.77
Big10	8486	0.32	0.47	0	1
Tenure	8486	5.06	3.02	1	17
Switch	8486	0.09	0.29	0	1
Size	8486	21.63	1.2	17.12	28.28
Debt	8486	0.49	0.2	0.05	0.95
Loss	8486	0.14	0.35	0	1
Growth	8486	0.03	0.08	-1.68	0.46
Cro_list	8486	0.09	0.29	0	1
Rec_inv	8486	0.28	0.18	0	0.94
Liquidity	8486	1.8	1.99	0.24	15.49
RPT	8486	0.21	5.07	0	200
Opinion_1	8486	0.03	0.17	0	1
Punish_1	8486	0.04	0.21	0	1
Fee	8486	13.22	0.68	10.31	17.81
Marketindex	8486	8.56	2.04	0.29	11.8
Lawindex	8486	10.2	5.27	0.18	19.89

Table 5  
Univariate tests.

Variable	Before audit mode change		After audit mode change		Difference in T/Z value	
	Mean	Median	Mean	Median	Mean	Median
Effort	5.62	5.52	5.61	5.53	0.618	0.434
Gov	-0.37	-0.39	0.04	-0.04	-29.421***	-31.10***
Big10	0.23	0	0.35	0	-10.26***	-10.20***
Tenure	4.39	4	5.29	5	-12.25***	-8.75***
Switch	0.09	0	0.1	0	-1.73*	-1.73*
Size	21.41	21.31	21.7	21.54	-9.94***	-8.96***
Debt	0.5	0.51	0.49	0.5	3.22***	2.75***
Loss	0.15	0	0.14	0	1.96**	1.96**
Growth	0.02	0.03	0.03	0.03	-4.74***	1.16
Cro_list	0.1	0	0.09	0	1.50	1.50
Rec_inv	0.3	0.28	0.27	0.25	5.39***	6.35***
Liquidity	1.55	1.18	1.89	1.29	-6.86***	-7.44***
RPT	0	0	0.29	0	-2.32**	-2.54**
Opinion_1	0.04	0	0.03	0	3.39***	3.39***
Punish_1	0.04	0	0.05	0	-1.14	-1.14
Fee	13.08	13.02	13.27	13.12	-11.57***	-11.80***
Marketindex	7.59	7.87	8.9	9.02	-27.27***	-27.43***
Lawindex	7.31	6.2	11.23	8.46	-31.93***	-31.30***

Note: T/Z value differences are based on T-tests and nonparametric Wilcoxon tests.

\* Statistical significance at the 10% level.

\*\* Statistical significance at the 5% level.

\*\*\* Statistical significance at the 1% level.

### 5.3.2. Controlling for the legal environment

During the period in which the audit mode changed, the legal environment also changed, which may have affected the relationship between audit effort and corporate governance. Hence, we re-examine the legal environment after the change (because the market process and legal environment are highly correlated, we no longer control for the marketization index when we control for the legal environment). The regression results, shown in Table 9, leave our conclusions unchanged, further supporting our hypotheses.

Table 6  
Audit mode change, corporate governance and audit effort.

Variable	Expected sign	Effort	Effort	Effort
Gov	–	–0.126 <sup>***</sup> (–6.03)	–0.124 <sup>***</sup> (–5.84)	0.109 <sup>**</sup> (2.12)
After	?		–0.036 (–0.72)	–0.068 (–1.34)
Gov * After	–			–0.277 <sup>***</sup> (–4.98)
Big10	?	0.085 <sup>***</sup> (3.32)	0.086 <sup>***</sup> (3.36)	0.086 <sup>***</sup> (3.37)
Tenure	?	–0.002 (–0.63)	–0.002 (–0.47)	–0.003 (–0.79)
Switch	?	0.070 <sup>*</sup> (1.67)	0.073 <sup>*</sup> (1.73)	0.067 (1.61)
Size	+	0.206 <sup>***</sup> (13.77)	0.207 <sup>***</sup> (13.79)	0.209 <sup>***</sup> (13.99)
Debt	+	–0.010 (–0.13)	–0.010 (–0.13)	–0.023 (–0.29)
Loss	+	0.033 (0.92)	0.033 (0.92)	0.031 (0.85)
Growth	–	0.212 (1.40)	0.205 (1.34)	0.182 (1.19)
Cro_list	+	0.174 <sup>***</sup> (4.17)	0.172 <sup>***</sup> (4.12)	0.166 <sup>***</sup> (3.97)
Rec_inv	+	0.081 (1.14)	0.079 (1.11)	0.075 (1.05)
Liquidity	–	–0.022 <sup>***</sup> (–3.22)	–0.022 <sup>***</sup> (–3.15)	–0.020 <sup>***</sup> (–2.83)
RPT	?	0.001 (0.52)	0.001 (0.53)	0.001 (0.48)
Opinion_1	+	0.015 (0.24)	0.017 (0.27)	0.021 (0.34)
Punish_1	+	0.052 (0.99)	0.053 (0.99)	0.060 (1.14)
Fee	?	0.578 <sup>***</sup> (23.07)	0.578 <sup>***</sup> (23.08)	0.579 <sup>***</sup> (23.12)
Marketindex	+	0.015 <sup>**</sup> (2.56)	0.015 <sup>***</sup> (2.64)	0.016 <sup>***</sup> (2.83)
Year		Controlled	Controlled	Controlled
Industry		Controlled	Controlled	Controlled
Constant		–6.530 <sup>***</sup> (–23.87)	–6.539 <sup>***</sup> (–23.88)	–6.568 <sup>***</sup> (–24.02)
N		8486	8486	8486
Adj-R2		0.31	0.31	0.31

\* Statistical significance at the 10% level.

\*\* Statistical significance at the 5% level.

\*\*\* Statistical significance at the 1% level.

Table 7  
Audit firm size, corporate governance and audit effort after audit mode change.

Variable	Expected sign	After audit mode change		
		Effort	Effort	Effort
Gov	–	–0.162 <sup>***</sup> (–6.92)	–0.164 <sup>***</sup> (–7.02)	–0.094 <sup>**</sup> (–3.47)
Big10	?		0.068 <sup>**</sup> (2.37)	0.088 <sup>***</sup> (3.03)
Gov*Big10	?			–0.219 <sup>***</sup> (–4.93)
Tenure	?	–0.008 <sup>*</sup> (–1.80)	–0.007 (–1.57)	–0.007 (–1.58)
Switch	?	0.081 <sup>*</sup> (1.69)	0.078 (1.62)	0.078 (1.63)
Size	+	0.211 <sup>***</sup> (12.27)	0.211 <sup>***</sup> (12.27)	0.211 <sup>***</sup> (12.31)
Debt	+	0.005 (0.06)	0.0104 (0.11)	0.001 (0.02)
Loss	+	0.008 (0.20)	0.010 (0.24)	0.012 (0.29)
Growth	–	0.260 (1.52)	0.260 (1.52)	0.239 (1.40)
Cro_list	+	0.205 <sup>***</sup> (4.11)	0.196 <sup>***</sup> (3.93)	0.181 <sup>***</sup> (3.61)
Rec_inv	+	0.068 (0.83)	0.068 (0.84)	0.076 (0.93)
Liquidity	–	–0.020 <sup>***</sup> (–2.61)	–0.020 <sup>**</sup> (–2.53)	–0.019 <sup>**</sup> (–2.53)
RPT	?	0.001 (0.51)	0.001 (0.50)	0.001 (0.45)
Opinion_1	+	0.047 (0.60)	0.050 (0.64)	0.051 (0.66)
Punish_1	+	0.013 (0.23)	0.014 (0.24)	0.008 (0.15)
Fee	?	0.587 <sup>***</sup> (20.46)	0.574 <sup>***</sup> (19.59)	0.565 <sup>***</sup> (19.30)
Marketindex	+	0.009 (1.50)	0.008 (1.25)	0.008 (1.35)
Year		Controlled	Controlled	Controlled
Industry		Controlled	Controlled	Controlled
Constant		–6.662 <sup>***</sup> (–21.63)	–6.503 <sup>***</sup> (–20.64)	–6.400 <sup>***</sup> (–20.30)
N		6244	6244	6244
Adj-R2		0.34	0.34	0.341

\* Statistical significance at the 10% level.

\*\* Statistical significance at the 5% level.

\*\*\* Statistical significance at the 1% level.

Table 8  
Audit firm size, corporate governance and audit effort before audit mode change.

Variable	Expected sign	Before audit mode change		
		Effort	Effort	Effort
Gov	–	0.036 (1.05)	0.032 (0.94)	0.009 (0.26)
Big10	?		0.085** (2.35)	0.131*** (2.78)
Gov*Big10	?			0.124 (1.52)
Tenure	?	0.011 (1.44)	0.013* (1.73)	0.012* (1.65)
Switch	?	–0.019 (–0.34)	–0.022 (–0.40)	–0.025 (–0.45)
Size	+	0.071*** (3.45)	0.069*** (3.31)	0.070*** (3.38)
Debt	+	–0.223** (–2.07)	–0.205* (–1.91)	–0.205* (–1.91)
Loss	+	0.026 (0.55)	0.026 (0.55)	0.027 (0.57)
Growth	–	–0.026 (–0.11)	–0.026 (–0.11)	–0.016 (–0.07)
Cro_list	+	–0.080 (–1.61)	–0.104** (–2.04)	–0.101** (–1.99)
Rec_inv	+	0.063 (0.66)	0.064 (0.67)	0.063 (0.66)
Liquidity	–	–0.010 (–0.99)	–0.010 (–1.00)	–0.010 (–0.98)
RPT	?	0.046 (0.42)	0.051 (0.46)	0.054 (0.49)
Opinion_1	+	–0.048 (–0.65)	–0.050 (–0.68)	–0.051 (–0.70)
Punish_1	+	0.063 (0.87)	0.070 (0.97)	0.071 (0.99)
Fee	?	0.179*** (5.59)	0.164*** (5.02)	0.165*** (5.05)
Marketindex	+	0.035*** (4.08)	0.033*** (3.88)	0.033*** (3.79)
Year		Controlled	Controlled	Controlled
Industry		Controlled	Controlled	Controlled
Constant		–4.151*** (–10.57)	–3.917*** (–9.68)	–3.967*** (–9.77)
N		2242	2242	2242
Adj-R2		0.07	0.07	0.08

\* Statistical significance at the 10% level.

\*\* Statistical significance at the 5% level.

\*\*\* Statistical significance at the 1% level.

Table 9  
Robustness test: controlling for legal environment.

Variable	Expected sign	Effort	Effort	Effort
<i>Panel A: Effect of audit mode change on relationship between corporate governance and audit effort</i>				
Gov	–	–0.128 <sup>***</sup> (–6.14)	–0.124 <sup>***</sup> (–5.86)	0.105 <sup>**</sup> (2.05)
After	?		–0.066 (–1.30)	–0.097 <sup>*</sup> (–1.88)
Gov*After	–			–0.272 <sup>***</sup> (–4.91)
Control variables		Controlled	Controlled	Controlled
Year		Controlled	Controlled	Controlled
Industry		Controlled	Controlled	Controlled
Constant		–6.443 <sup>***</sup> (–23.61)	–6.452 <sup>***</sup> (–23.64)	–6.477 <sup>***</sup> (–23.76)
N		8486	8486	8486
Adj-R2		0.31	0.31	0.34
Variable	Expected sign	After audit mode change		
		Effort	Effort	Effort
<i>Panel B: Audit firm size, corporate governance and audit effort</i>				
Gov	–	–0.163 <sup>***</sup> (–6.98)	–0.165 <sup>***</sup> (–7.06)	–0.094 <sup>***</sup> (–3.47)
Big10	?		0.059 <sup>**</sup> (2.03)	0.079 <sup>***</sup> (2.69)
Gov*Big10	?			–0.221 <sup>***</sup> (–4.97)
Control variables		Controlled	Controlled	Controlled
Industry/Year		Controlled	Controlled	Controlled
Constant		–6.603 <sup>***</sup> (–21.51)	–6.473 <sup>***</sup> (–20.65)	–6.366 <sup>***</sup> (–20.30)
N		6244	6244	6244
Adj-R2		0.34	0.34	0.34

\* Statistical significance at the 10% level.

\*\* Statistical significance at the 5% level.

\*\*\* Statistical significance at the 1% level.

### 5.3.3. Controlling for the self-selection problem

Because a client's choice of auditor is a business decision that is seldom random, there may be a self-selection problem. For example, a client may choose a large audit firm, which is more likely to provide a high-quality audit, to signal excellence to the market (Francis, 1984; Francis and Simon, 1987). We thus speculate that companies that differ in corporate governance quality may also differ in their choice of auditor and that auditors may accept clients in accordance with their level of corporate governance, thus creating a self-selection problem that may bias least squares estimation. To control for this possibility, we use Heckman's (1978) two-stage selection, as follows.

First, we estimate the probability model of an audit firm being chosen to calculate the inverse Mills coefficient (i.e., Mills). The first step in Model (3) is shown below, with the dependent variable being the probability of a listed company selecting a Big Ten audit firm.

$$\begin{aligned} \text{Pr}(\text{Big10}) = & \gamma_0 + \gamma_1 \text{Size} + \gamma_2 \text{Capital} + \gamma_3 \text{Cycle} + \gamma_4 \text{Roa} + \gamma_5 \text{Growth} \\ & + \gamma_6 \text{Loss} + \gamma_7 \text{Gov} + \gamma_8 \text{Year} + \gamma_9 \text{Industry} + \varepsilon \end{aligned} \quad (3)$$



The independent variables in Model (3) come primarily from Francis and Krishnan (1999), with some additional variables. Francis and Krishnan (1999) argue that companies with a high level of accruals are more likely to employ large audit firms, with capital intensity and the business cycle being the key variables affecting the level of accruals. Capital intensity (total fixed assets divided by net sales) mainly measures long-term accruals, with greater capital intensity indicating fewer accruals. The longer the operating cycle (inventory turnover days + accounts receivable turnover days) and the more inventory and accounts receivable, the higher the level of accruals. To these two variables, we add company size, growth, profitability and financial distress. As the new auditing standards require auditors to evaluate a client's corporate governance, we also include the corporate governance index (Gov) in this model (variable definitions not reported due to space constraints).

Second, we incorporate the estimated inverse Mills coefficient (i.e., Mills) into Model (2), and then regress according to the previous method.

The results of the self-selection regression model show that the greater a company's size, sales cycle, profitability and corporate governance index, and the lower its capital intensity, the greater the probability of it hiring one of the Big Ten. The coefficients for each variable are consistent with expectations. The regression results are essentially consistent with Table 7, and as they are based on the estimated Mills coefficient used in Model (3) and entered into the Model (2) regression, they support our earlier conclusion (results unreported due to space constraints).

#### 5.3.4. Endogenous decision-making problems between audit effort and corporate governance

Jensen and Meckling (1976) consider external auditing to be an important guarantee mechanism for reducing both conflicts of interest between a company's contractual parties and agency costs. The visibility of external auditors affects a company's corporate governance, and there may thus be an endogeneity problem between decisions made by external auditors (including their allocation of audit effort) and corporate governance risk, which could in turn affect the reliability of the estimated coefficients in the regression model. Caramanis and Lennox (2008) encounter a similar problem in the relationship between audit effort and earnings quality, and use lagged estimated audit effort as the instrumental variable to solve the corresponding endogeneity problem.

Drawing on Caramanis and Lennox (2008), to represent corporate governance we select an instrumental variable that does not directly affect audit effort. The lag variable of corporate governance is deemed appropriate for this purpose, as it meets the demands of both the Sargan and Hausman tests as an instrument.

Furthermore, although the internal and external governance environment is constantly changing in theory, it is not reasonable to expect auditors to consider the lag in corporate governance when making decisions. Hence, although lagged corporate governance variables can explain the current period of corporate governance, they are unlikely to affect current audit effort directly. Empirical tests confirm that the lag in corporate governance can explain current corporate governance but has no direct correlation with current audit effort (results unreported owing to space constraints). We thus use the estimated lag in corporate governance as an instrumental variable in the corresponding regression analysis. As shown in Table 10, the results still support the original conclusion.

#### 5.3.5. Structural change test

Because all listed companies in China have been affected by the new auditing standards, no control sample is possible, rendering it difficult to exclude other factors over the study period. We thus conduct sub-period analysis to examine the relationship between corporate governance and audit effort before and after 2007. Using the Chow test with dummy variables, we assess whether there has been structural change. The results in Table 11 show that in the period before 2007 there is a positive correlation between audit effort and corporate governance, which is inconsistent with our theoretical expectation. In the period after that year, however, there is a negative correlation between the two, and a coefficient difference test shows the difference to be significant ( $T$  value =  $-4.97$ ). Hence, the relationship between audit effort and governance before and after 2007 is the result of structural change.

Table 10  
Robustness test: controlling for endogenous decision-making problem.

Variable	Expected sign	Effort	Effort	Effort
<i>Panel A: Effect of audit mode change and corporate governance on audit effort</i>				
Gov_1	–	–0.095 <sup>***</sup> (–3.20)	–0.095 <sup>***</sup> (–3.20)	0.151 <sup>**</sup> (2.03)
After	?		–0.191 <sup>***</sup> (–3.59)	–0.292 <sup>***</sup> (–4.87)
Gov_1*After	–			–0.291 <sup>***</sup> (–3.95)
Control variables		Controlled	Controlled	Controlled
Year		Controlled	Controlled	Controlled
Industry		Controlled	Controlled	Controlled
Constant		–6.448 <sup>***</sup> (–19.85)	–6.256 <sup>***</sup> (–19.74)	–6.198 <sup>***</sup> (–19.55)
N		6360	6360	6360
Adj-R2		0.31	0.31	0.31
Variable	Expected sign	After audit mode change		
		Effort	Effort	Effort
<i>Panel B: Audit firm size, corporate governance and audit effort</i>				
Gov_1	–	–0.133 <sup>***</sup> (–4.05)	–0.135 <sup>***</sup> (–4.11)	–0.002 (–0.06)
Big10	?		0.068 <sup>**</sup> (2.13)	0.075 <sup>**</sup> (2.36)
Gov_1*Big10	?			–0.359 <sup>***</sup> (–6.46)
Control variables		Controlled	Controlled	Controlled
Industry and year		Controlled	Controlled	Controlled
Constant		–6.531 <sup>***</sup> (–18.78)	–6.374 <sup>***</sup> (–17.93)	–6.269 <sup>***</sup> (–17.69)
N		5080	5080	5080
Adj-R2		0.31	0.31	0.33

\* Statistical significance at the 10% level.

\*\* Statistical significance at the 5% level.

\*\*\* Statistical significance at the 1% level.

Based on the empirical tests above, we consider our main conclusions to be relatively robust.

#### 5.4. Supplementary analysis

If, following the adoption of the risk-based audit mode, auditors exerted greater effort in the face of poor corporate governance, and thus improved audit quality and corporate governance while simultaneously reducing audit effort without any decline in audit quality, that would constitute further proof of the optimization of audit effort in the post-change period.

We thus conduct supplementary analysis using earnings quality as a proxy for audit quality, and find that for companies with poor corporate governance, increased audit effort reduces earnings management and improves audit quality. We also find no evidence of a decline in audit quality when audit effort is reduced due to better corporate governance. These findings suggest that the implementation of the risk-based audit mode has indeed optimized audit effort in China (results unreported due to space constraints).

Table 11  
Results of chow test for dummy type.

Variable	Expected sign	Effort (1) Before audit mode change	Effort (2) After audit mode change
Gov	–	0.110** (2.09)	–0.168*** (–7.17)
Control variables		Controlled	Controlled
Year		Controlled	Controlled
Industry		Controlled	Controlled
Constant		–6.756*** (–10.99)	–6.422*** (–20.26)
Diff of (1) & (2)		–0.287*** (–4.97)	
N		2242	6244
Adj-R2		0.25	0.33

\* Statistical significance at the 10% level.

\*\* Statistical significance at the 5% level.

\*\*\* Statistical significance at the 1% level.

## 6. Conclusions

Given that contract management creates an incentive to manipulate financial information, auditors who adopt the internal control-based mode find it difficult to identify financial manipulation by management, which affects both the efficiency and results of their audits. The risk-based system, in contrast, requires auditors to perform a deeper assessment of clients' corporate governance, as reasonable and effective corporate governance directly constrains management from falsifying financial statements.

Based on a literature review and an analysis of China's institutional background, this study examines whether auditors have been evaluating corporate governance to guide their allocation of audit effort since the government-mandated change to the risk-based audit mode. It also explores the optimal allocation of audit effort needed to improve audit effectiveness and the way in which corporate governance has influenced the allocation of audit effort since the change in audit mode. Our findings show that under the earlier internal control-based mode, the relationship between audit effort and corporate governance was weak, but became significantly stronger following the implementation of the risk-based mode. Further analysis shows that since the change in audit mode, Big Ten auditors have gained a significantly better grasp of governance risk and allocated their audit efforts accordingly.

The results indicate that the mandatory switch to the risk-based audit mode has improved the ability of auditors in China to practice risk control and audit efficiency. However, the Chinese Institute of CPAs needs to strengthen its supervision and inspection, particularly for smaller auditing firms, to ensure a better understanding and more skilled use of the risk-based mode. Our study offers a useful perspective on the issues concerned and provides empirical evidence for the development of policy relating to investor protection and market regulation.

It should be noted that there are some inherent limitations in our sample. Most importantly, because the regulations require all listed companies and auditors to apply the risk-based audit mode, it is not possible to find a control sample of companies unaffected by the new auditing standards for use in our regression models.

## Appendix A

Based on PCA, we use software to normalize the 12 indicators and select 5 main components. The corporate governance index is based on the weightings of principal components Y1 to Y5 ( $Gov = W1 * Y1 + W2 * Y2 + W3 * Y3 + W4 * Y4 + W5 * Y5$ , where W is the calculated variance contribution rate). The factor loadings of the principal components are shown in Table 12. In PCA, a factor with a

Table 12  
Principal component factor loadings.

Name		Principal component				
		Y1	Y2	Y3	Y4	Y5
Shareholding structure and shareholder equity	Largest shareholder ownership	0.16	0.27	0.33	0.52	-0.48
	Shareholder concentration	0.50	0.18	0.40	0.14	-0.29
	Proportion of state-owned shares	-0.39	-0.46	0.21	0.56	0.22
	Proportion of board shareholding	0.85	-0.38	0.07	-0.18	0.04
	Proportion of supervisory committee shareholding	0.14	-0.66	0.17	0.40	0.25
Management governance	Managerial ownership	0.85	-0.39	0.07	-0.17	0.04
	CEO duality	0.36	-0.16	-0.21	-0.00	-0.04
Directors, supervisors and other forms of governance	Board size	-0.25	0.09	0.66	0.14	-0.29
	Proportion of independent directors	0.27	0.18	-0.61	0.28	-0.18
	Board meeting frequency	0.20	0.52	-0.01	0.11	0.61
	Supervisory board meeting frequency	0.40	0.51	0.08	0.19	0.43
	Number of committee members	0.34	0.44	0.17	0.10	-0.04

loading greater than 0.3 is generally considered significant in explaining the original variable. For the first principal component, the loading factors of shareholder concentration, proportion of board shareholding and management ownership account for more than 50% of the variance, and are thus used to represent and reflect shareholding structure, shareholder equity and managerial ownership. The second principal component is a less important factor in the composition, and the loading factors of the meeting frequency of the board of directors and supervisory board are slightly more significant than the other indicators, and better reflect directors, supervisors and other forms of governance. For the third main component, the highest loading factors are board size followed by shareholder concentration, and these two indicators thus reflect shareholding structure and shareholder equity, and directors, supervisors and other forms of governance. For the fourth principal component, the largest loading factors are the largest shareholder and state-owned shares, which account for more than 50%, and thus better reflect shareholding structure and shareholder equity. For the fifth main component, the loading factors of board and supervisory board meeting frequency are the most significant indicators to reflect directors, supervisors and other forms of governance. Thus, the keys to improving corporate governance are to increase the shareholdings of the largest shareholders, to reduce the proportion of state-owned shares, and to increase managerial ownership and the meeting frequency of both the board of directors and supervisory board.

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