Does Industry Regulation Matter? New Evidence on Audit Committees and Earnings Management

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Abstract This paper investigates the moderating role of industry regulation on the effectiveness of audit committees in restricting earnings management. Using comprehensive panel data of S&P 1500 firms between 2003 and 2007, we find that the proportion of CEO directors on an audit committee is positively associated with earnings management in unregulated industries, while this association is significantly weaker in regulated industries. Further, the proportion of financial experts on an audit committee is negatively associated with earnings management. Our results also indicate that the average board tenure of audit committee members is negatively related to earnings management in regulated industries, but positively affects earnings management in unregulated industries. Finally, audit committee members' average directorship increases earnings management in regulated industries, but reduces earnings management in unregulated industries. Overall, our results suggest that the effectiveness of audit committees in reducing earnings management and improving financial reporting quality is influenced by industry regulation.

Keywords Audit committee · Industry regulation · Earnings management · Accounting ethics · Corporate governance

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Introduction

The generally accepted accounting principles (GAAP) offer corporate managers latitude to exercise judgment in preparing financial statements. However, there is a long-standing problem that opportunistic managers may abuse such accounting discretion and engage in earnings management to increase their own wealth at the expense of shareholders (Christie and Zimmerman 1994). Healy and Wahlen (1999) define earnings management as a process in which managers "use judgment in financial reporting and in structuring transactions to alter financial reports to either mislead some stakeholders about the underlying economic performance of the company or to influence contractual outcomes that depend on reported accounting numbers." The severity of earnings management has come under the public spotlight because of major financial scandals occurring recently such as those at Enron, Adelphia, Allied Carpet, and Sunbeam (Greenfield et al. 2008). In all these cases, top management has been found to manipulate earnings aggressively through tactical use of accounting accruals to disguise their firms' real performance. However, earnings management is always a means to an end. It has been argued that the key motive for such manipulation is often associated with top management's intention to achieve personal gains such as higher incentive compensation (Dechow et al. 1996; Holthausesn et al. 1995), improved job security (Defond and Park 1997), or better reputation through impression management (Davidson et al. 2004). Arthur Levitt, the former chairman of the Securities and Exchange Commission (SEC), therefore, stressed that earnings management is "the numbers game" that poisons the financial reporting process and runs counter to the very principles behind the U.S capital market's strength and success (Levitt 1999).

Earnings management can be accomplished through many different means, such as modifying duration time of depreciable assets, changing estimation on accounts receivables, or altering the estimated amount of warranties (Huang et al. 2008). In most instances, managers could strive to keep their earnings management activities within the boundaries set by regulation and comply with accounting standards. Therefore, earnings management may not be illegal, but instead poses an ethical dilemma for accountants (Kaplan 2001; Kaplan et al. 2007; Staubus 2005). Actually, earnings management has been labeled as "probably the most important ethical issue facing the accounting profession" (Merchant and Rockness 1994).

The extant literature suggests that a firm with more effective internal corporate governance mechanisms, such as a vigilant board of directors or a capable audit committee, is able to better supervise managerial activities and constrain management from managing earnings opportunistically (see reviews by Cohen et al. 2004; Dechow et al. 2010). The underlying argument is drawn upon agency theory (Fama 1980; Fama and Jensen 1983). The standard agency model argues that the separation of ownership and control leads to moral hazard problems, when managers may act to gain private benefits at the cost of shareholders. Monitoring by the board of directors or its subcommittees can help alleviate such moral hazard problems. The effectiveness of board monitoring is influenced by composition, structure, and activity of the board and its subcommittees (Hermalin and Weisbach 1997). Consequently, such factors as board and audit committee independence, and financial expertise of board members are all found to affect earnings management level (e.g., Dechow and Skinner 2000; Healy and Wahlen 1999).

Over the years, a series of regulations has been enacted to mitigate managerial opportunisum and to improve financial reporting quality. For example, the New York Stock Exchange (NYSE) and the National Association of Securities Dealers Automated Quotations (NASDAQ) both require publicly traded corporations to maintain an audit committee with at least three outside directors and mandate all audit committee members to be financially literate with at least one member of the committee having prior accounting or financial employment. The Sarbanes–Oxley Act (SOX) of 2002 also specifies that audit committees in listed firms should consist entirely of independent directors and include at least one financial expert. The underlying rationale of these regulations is consistent with the "best practice" assumption that certain board structures are better than the others in improving listed firms' financial reporting quality and protecting shareholder interests.

A group of managerial scholars however criticize the universal notions of "best practice" based on agency theory as "undercontextualized" that are unable to "accurately compare and explain the diversity of corporate governance arrangements across different organizational and institutional contexts" (Aguilera et al. 2008). They indicate that this one-size-fits-all approach is undesirable, and corporate governance policies will be more effective if taking into account organizational contextual factors. Consequently, these researchers suggest corporate governance studies should adopt a contingency-based framework that explicitly incorporates organizational context and institutional environments to advance our understandings (Aguilera et al. 2008; Filatotchev and Allock 2010).

Along these lines, we augment prior earnings management literature built on agency theory by explicitly incorporating one important institutional context, industry regulation, to examine the moderating role of industry regulation on the effectiveness of audit committees in constraining earnings management. We argue that industry regulation is an important contingent factor that influences the efficacy of certain board and audit committee structures in improving financial reporting quality. Prior empirical studies on earnings management either focus on all industries indifferently (e.g., Bowen et al. 2008; Huang et al. 2008; Klein 2002; Xie et al. 2003) or completely exclude regulated industries (e.g., Bédard et al. 2004). Unlike these studies, we explicitly examine whether audit committee characteristics influence earnings management in a different way in regulated and unregulated industries. Given the special context of a regulated industry where managers may have different motivations to manage earnings and corporate governance mechanisms may function differently, such an investigation also has important practical applications.

Our paper is also significantly different from prior studies that investigate the direct effect of industry regulation on earnings management or internal government mechanisms. On the one hand, extant studies have found that managers in certain industries are more likely to manipulate financial statements. For example, Ahmed et al. (1999), Beatty et al. (1995), and Collins et al. (1995) all document that more restrictive bank loss provisions in the banking industry lead to more earnings management and smoothing activities. That is, industry regulation directly affects earnings management level. On the other hand, a limited number of studies have also found that corporate governance arrangements vary by industries. Booth et al. (2002), for example, observe that managerial equity ownership is significantly lower in regulated firms than in unregulated firms. They argue that more restrictive regulation in regulated industries substitutes for the need for high-powered managerial incentives. In contrast, Becher and Frye (2011) show that regulated firms have a greater proportion of monitoring directors and larger boards than unregulated firms. They conclude that industry regulation

complements internal governance by demanding more intense monitoring from the board. Nevertheless, these studies suggest that industry regulation shapes internal governance structures.

Although existing studies have investigated the direct relationship between industry regulation and earnings management, or between industry regulation and internal corporate governance structure, a crucial unanswered question is the moderating role of industry regulation on the relationship between internal governance structure and earnings management, specifically whether industry regulation influences the effectiveness of an audit committee in constraining earnings management. Or in another words, whether regulated and unregulated industries demand different types of audit committees to supervise the financial reporting process. The focus of our study therefore is able to fill in a gap noted by Cohen et al. (2004) on "the lack of governance related research that focuses on the issue of regulated vs. unregulated industries."[1]

Finally, by setting our sample in the post-SOX era with more restrictive regulatory rules and strengthened audit committee authority, we are able to provide a more conservative test of audit committee effectiveness (Braiotta and Zhou 2006). In this sense, our paper also complements the majority of existing literature that examines the role of audit committees in the pre-SOX period by providing additional evidence on this topic (e.g., Bédard et al. 2004; Huang et al. 2008; Klein 2002; Xie et al. 2003).

The remainder of this study is organized as follows. We develop our hypotheses in "Hypothesis Development" section. "Methodology" section describes sample selection, research designs, and empirical models. "Results" section reports results of empirical analysis and sensitivity analysis, and we present our conclusions and discussions in "Discussions and Conclusions" section.

Hypotheses Development

The complexity of a firm's accounting and financial information requires audit committee members to invest substantial efforts. A small committee may not possess sufficient resource and manpower to devote to such matters, which may impair its effectiveness in detecting and controlling earnings management (Beasley and Salterio 2001). However, as the size of a committee increases, individual committee members may not exert enough effort in the committee work due to the free rider problem. For

example, Yermack (1996) shows that firms with smaller boards are able to better discipline CEOs in cases of poor performance. Similarly, Beasley (1996) finds that the likelihood of financial fraud increases as board size increases. These studies thus suggest that a smaller board is associated with higher monitoring quality. Consequently, we expect a positive relationship between audit committee size and earnings management.

The negative effect of a large audit committee may be particularly salient in a regulated industry. Several studies have suggested that executives in regulated firms are less actively monitored than those in unregulated industries because directors of regulated firms face less market pressure to do so (Helland and Sykuta 2004). Baysinger and Zardkoohi (1986), for example, find that boards of public utilities have more symbolic directors than those of less regulated firms. These directors often perform functions related to regulatory concerns such as helping the firm navigate political environments, and are thus different from board members in industrial firms who are mainly in charge of monitoring top management. Agrawal and Knoeber (2001) similarly find that outside directors in utility firms are often selected based on their political usefulness in predicting government actions. Because board members in regulated industries are more likely to engage in other activities apart from monitoring managerial behavior, we predict that the positive relationship between audit committee size and earnings management is stronger in regulated industries than in unregulated industries. We thus make the following predictions.

H1a Audit committee size is positively associated with earnings management.

H1b The positive association between audit committee size and earnings management is stronger in a regulated industry.

The effectiveness of an audit committee is also influenced by its composition. The extant literature has long suggested that the higher the proportion of independent directors on the audit committee, the better the monitoring quality and the less likely firms would engage in earnings management (Bédard et al. 2004; Klein 2002). However, upper echelons theory suggests that corporate executives view themselves as the upper class of the business community and are often identified with fellow executives (Useem 1984). As a result, when outside directors are CEOs of other companies, they tend to form a coalition with top management of the firm to support peer CEOs in board decision, and are less likely to carefully safeguard shareholder interests (Conyon and He 2004; Weshphal and Zajac 1997). For example, O'Reilly et al. (1988) demonstrate that CEO compensation is greater when CEOs from

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[1] It should be noted that our aim is to examine the moderating role of an overall regulatory environment on the efficacy of audit committees instead of testing the effect of a specific regulation such as the SOX as in Ghosh et al. (2010) or a specific industry such as banking as in Palvia (2011) or airline as in Kole and Lehn (1999).

other firms sit on a firm's compensation committee. Similar results are echoed by Conyon and He (2004) in their study of compensation committees in newly public entrepreneurial firms. By the same token, we expect that other things being equal the higher the proportion of CEO directors on an audit committee, the lower the monitoring quality, and the larger the magnitude of earnings management.

The influence of outside CEO directors may not be as salient in a regulated industry as in an unregulated industry. Booth et al. (2002) notice regulation reduces the impact of managerial decision on shareholder wealth. Strengthened regulation and more complicated reporting systems restrict the leeway of top management and substitute for the need for internal monitoring mechanisms, thus attenuate the impact of inferior board monitoring on shareholder wealth. Booth et al. (2002) consequently observe that managerial equity ownership is significantly lower in regulated firms than in unregulated firms. They argue that more restrictive regulation in regulated industries reduces the need for high-powered managerial incentives. As a result, effective internal monitoring mechanisms become less important in mitigating agency problems in regulated industries. Similarly, Joskow et al. (1996) observe that CEO compensation is lower in the electric utility industry because the threat of corrective actions by regulators and increased scrutiny on regulated firms force these firms to adopt more effective monitoring systems that restrict CEO compensation. Consequently, we expect that the positive relationship between the proportion of outside CEO directors on the audit committee and earnings management is weaker in a regulated industry because external industry regulation restricts the potential of outside CEO directors to collude with management. Overall, we make the following predictions.

H2a The proportion of outside CEO directors on the audit committee is positively associated with earnings management.

H2b The positive association between the proportion of outside CEO directors on the audit committee and earnings management is weaker in a regulated industry.

Besides committee size and composition, the effectiveness of an audit committee is also influenced by knowledge and experiences of its members. A financial expert possesses more advanced financial and accounting knowledge than an ordinary board member, thus is able to better understand and monitor a firm's financial reporting process. Consequently, extant studies have found that a larger proportion of financial experts on an audit committee or a board of directors is associated with a smaller likelihood of financial restatements, fewer financial frauds, and less earnings management (DeFond et al. 2005; Dhaliwal et al.

2010; Krishnan and Visvanathan 2008). Consistent with these studies, we hypothesize that the higher the proportion of financial experts serving on an audit committee the better the monitoring quality, and the less likely a firm will engage in earnings management.

The role of financial experts could be particularly crucial in a regulated industry due to more complex financial reporting and accounting rules in these industries. Kanagaretnam et al. (2010), for example, suggest that auditing banks is more complicated than auditing industrial firms. According to the American Institute of Certified Public Accountants' (AICPA 2006) report, banks' loan loss allowance ranks number one among various deficiencies found by Public Company Accounting Oversight Board (PCAOB) inspectors. This evidence suggests that auditing banking industries is more challenging for auditors in general. In addition, more complex accounting rules in regulated industries require audit committee members to possess more in-depth financial knowledge to understand financial reports. For example, the banking industry demands banks to satisfy certain capital adequacy requirements to insure safeness, fair lending practices, and consumer protection. The insurance industry requires insurers to meet conditions for minimum financial health to protect consumers' interests. As a result, lack of financial expertise in audit committees may hurt financial reporting quality of regulated firms even more than that of unregulated firms. Taken together, we expect that the negative relationship between the proportion of financial experts on an audit committee and earnings management is stronger in a regulated industry, which leads to the following predictions.

H3a The proportion of financial experts on an audit committee is negatively associated with earnings management.

H3b The negative association between the proportion of financial experts on an audit committee and earnings management is stronger in a regulated industry.

Further, the quality of an audit committee may also be influenced by the tenure of committee members. Extant literature has made two contradictory predictions on the impact of board members' and audit committee members' tenure on the effectiveness of corporate governance mechanisms. One stream of literature suggests that board members may entrench themselves and become more aligned with managers' instead of shareholders' interests as their board tenure increases, thus leading to inferior monitoring quality. For example, Lys and Watts (1994) find that auditor independence decreases with the length of auditor tenure, results in poorer audit quality and greater earnings management. O'Reilly et al. (1988) and Belliveau et al. (1996) argue that increased overlapping tenure between the CEO and the compensation committee chair

leads to increased social obligation of the committee chair to the CEO, thus reducing the capability of the committee chair to make decision in the shareholders' interests. They consequently find that the longer the overlapping tenure of a compensation committee chair with the CEO, the higher the CEO compensation is.

The other stream of literature emphasizes that board members' experience increases with firm tenure. For example, Myers et al. (2003) argue that auditors with longer tenure are able to gain more experiences and insights into the client's operations, business strategies, and internal control systems, and are thus more effective in overseeing a firm's financial reporting process. Consequently, they document a negative relationship between auditor tenure and earnings management. Similarly, Ghosh et al. (2010) find a significant negative relationship between average tenure of audit committee members and earnings management. They show that audit committee members with longer tenure are more effective in mitigating earnings management.

In particular, we expect that the experience effect would be more salient in regulated industries, because more complicated financial reporting rules in these industries put more burdens on audit committee members to fully understand industry and regulatory contexts, which may not be easily achievable by junior committee members. In contrast, the entrenchment effect may dominate in unregulated industries because a larger degree of managerial discretion in these industries gives managers more room to manipulate earnings. Consequently, we make the following predictions.

H4a The average tenure of audit committee members is positively associated with earnings management in an unregulated industry.

H4b The average tenure of audit committee members is negatively associated with earnings management in a regulated industry.

Finally, the effectiveness of an audit committee is influenced by committee members' activities. Directors serving on multiple boards may become overcommitted and have less time to devote to a particular task. Pritchard et al. (2003) and Fitch and Shivdasani (2006) both document that firms experience lower market-to-book ratios, weaker operating profitability, and a smaller CEO turnover–performance elasticity when a majority of outside directors sit on too many boards. Similarly, audit committee members with multiple directorships may be too busy due to time and effort absorbed by other roles they play. As a result, they may not be able to provide sufficient oversight of a firm's financial reporting process. This busyness assumption thus predicts a positive relationship between committee members' external directorship and earnings management.

Alternatively, audit committee members may gain general knowledge of the industry and business by sitting on additional boards, and become more experienced, knowledgeable, and well-connected (Carpenter and Westphal 2001; Loderer and Peyer 2002). The number of board seats held by a committee member may also indicate the quality of the member if the labor market for outside directors is efficient. Srinivasan (2005), for instance, suggests that audit committee members suffer significant labor market penalties from financial reporting failure. Committee members in firms experiencing earnings restatements are more likely to lose their board seats and less likely to obtain positions on other boards. Therefore, the number of board seats may indicate board members' quality. The more seats a member holds the better monitor the member is. This learning and reputation prediction thus suggests a negative relationship between audit committee members' external board seats and earnings management.

We expect that the learning effect is less important in regulated industries due to specificity and complexity of financial reporting rules in these industries that reduce the capability of audit committee members to learn from additional external directorships. The extra financial reporting requirements on regulated industries also intensify the negative impact of busyness on committee members' capability to vigilantly examine financial reports. We thus predict a positive relation between audit committee members' external directorship and earnings management in regulated industries. In contrast, we expect that the learning and reputation effect may overwhelm the busyness effect in unregulated industries because a more generalized labor market in industrial firms enables committee members to learn from their external directorship and carry their knowledge among firms. Consequently, we expect a negative relation between external directorship of audit committees and earnings management in unregulated firms. Overall, we predict:

H5a The average directorship of audit committee members is negatively associated with earnings management in an unregulated industry.

H5b The average directorship of audit committee members is positively associated with earnings management in a regulated industry.

Methodology

Sample Selection

Audit committee and board data are collected from the Investor Responsibility Research Center (IRRC), now

known as RiskMetrics. The data provide detailed demographic and positional information for directors in S&P 1500 firms. Five-year panel data between 2003 and 2007 are obtained. Accounting and financial information used to calculate earnings management, and other control variables is obtained from COMPUSTAT for the same period. After deleting firms with incomplete financial, board, and audit committee information, our final sample includes 6,239 firm-year observations representing 1,607 unique firms. The yearly distribution of our sample is: 1,175 observations in 2003, 1,300 observations in 2004, 1,407 observations in 2005, 1,325 observations in 2006, and 1,032 observations in 2007.

Dependent Variables

Earnings management is typically measured using the accrual method by calculating the discrepancy between actual accruals and expected accruals (normal accruals), so-called "abnormal accruals." A higher value of abnormal accruals indicates more earnings management and lower financial reporting quality. Consistent with Xie et al. (2003), we calculate earnings management as performance-adjusted discretionary current accruals. We first use the entire population of COMPUSTAT firms to estimate parameters for normal accruals (CA) for each two-digit SIC industry by year using the following equation:

$$CA_t = \beta_0 + \beta_1(1/TA_{t-1}) + \beta_2(\Delta Rev_t) + \beta_3(ROA_{t-1}) + \varepsilon_t,$$

$$(1)$$

where CA_t indicates current accruals reflected by net income before extraordinary items plus depreciation and amortization minus operating cash flows scaled by total assets at the beginning of year t. TA_{t-1} is total assets at the beginning of year t. ΔRev_t is changes in sales calculated as net sales in year t minus net sales in year $t-1$ scaled by the beginning-of-year total assets. ROA_{t-1} is return on assets ratio in year $t-1$ calculated as income before extraordinary items scaled by total assets. All variables are winsorized at the first and 99th percentiles. The parameters estimated from Eq. (1) are used to calculate expected current accruals (ECA) using the following method:

$$ECA_t = b_0 + b_1(1/TA_{t-1}) + b_2(\Delta Rev_t - \Delta AR_t) + b_3(ROA_{t-1})$$

$$(2)$$

where ΔAR_t indicates changes in accounts receivable calculated as accounts receivable in year t minus accounts receivable in year $t-1$, scaled by the beginning of year total assets. Finally, we calculate the discretionary current accruals as the difference between actual accruals (CA) and

ECA from Eq. (2) to indicate the level of earnings management, denoted as "Earnings Management":

$$\text{Earnings Management}_t = CA_t - ECA_t \qquad (3)$$

Independent and Control Variables

AUDIT_SIZE measures the size of an audit committee as the total number of directors sitting on an audit committee. CEO_RATIO captures the proportion of outside CEO directors on an audit committee, where "CEO directors" refers to those directors who are CEOs of other corporations. EXPERT_RATIO measures the proportion of financial experts serving on an audit committee. We classify a director as a financial expert when he/she is a CPA, an accountant, an auditor, a controller, a managing partner of a financial institution, CFO, CAO, CEO, or the president of a company (Agrawal and Chadha 2005; DeFond et al. 2005). AVE_TENURE is calculated as the sum of all audit committee members' board tenure divided by the committee size, where director tenure is measured as the number of years a director has served on the board. The average directorship, AVE_SEAT, is calculated as the sum of each committee member's outside directorships divided by the committee size, where directorship is measured as the number of board seats a director is holding.

The REGULATED dummy variable is coded based on Becher and Frye (2011)'s classification with one indicating the firm is in a regulated industry and zero otherwise. The regulated industries include industries with an SIC code of 4900–4939 (electric and gas), 1300 (oil and gas extraction), 4000–4700 (transportation), 4800 (telecommunications), 4950–4959 (sanitary services), and all 6000s (financial companies). Within our final sample, 5,044 firm-year observations are unregulated (representing 1,301 unique firms), and 1,195 firm-year observations are regulated (representing 306 unique firms). Then we interact the REGULATED dummy variable with all independent variables described above.

Several control variables are also included in our models. We first control for board characteristics because an audit committee cannot be effective in fulfilling its oversight functions without strong board support (Cohen et al. 2004). Three measures of board characteristics are included. We capture leadership duality using a dummy variable, COMBINE, which equals to one if there is a combined CEO and chairperson position and zero otherwise. BOARD_IND-RATIO is calculated as the proportion of independent directors serving on the board. Here, a director is classified as independent if he/she is neither a current or former employee of the company nor has any contractual relationship with the company. BLOCK_BOARD indicates the presence of a block-holder, a shareholder with 5 % or larger equity holdings, on the board. We also control for firm characteristics that may influence earnings management (Klein 2002). Firm

size (FIRM_SIZE) is measured as the natural log value of net assets at the beginning of the year. LEVERAGE is captured by the debt-to-equity ratio calculated as long-term debt divided by total equity. A dummy variable LOSS is used to indicate whether a firm is experiencing a net income loss in the year. Auditor change (CPA_CHG) is coded as one if a firm changes its auditor compared to its previous year, and zero otherwise. A dummy variable (BIG4) is used to indicate whether the firm's external auditor is one of the big four auditing firms. Finally, we control for year dummy variables. Detailed variable definitions are summarized in Appendix.

Empirical Methods

We conduct our analysis using ordinary least square (OLS) regressions. Because we have multiple years of observations in each firm, the assumption that observations are independent may be violated. As a result, we calculate robust standard errors using Huber's (1967) formula by clustering observations into different groups (firms in our case). Our regression models are specified in Eq. (4) as follows:

$$
\begin{aligned}
\text{Earnings management} = {} & \beta_0 + \beta_1 \text{AUDIT\_SIZE} \\
& + \beta_2 \text{CEO\_RATIO} + \beta_3 \text{EXPERT\_RATIO} \\
& + \beta_4 \text{AVE\_TENURE} + \beta_5 \text{AVE\_SEAT} \\
& + \beta_6 \text{REGULATED} + \beta_7 \text{REGULATED} \\
& \times \text{AUDIT\_SIZE} + \beta_8 \text{REGULATED} \times \text{CEO\_RATIO} \\
& + \beta_9 \text{REGULATED} \times \text{EXPERT\_RATIO} \\
& + \beta_{10} \text{REGULATED} \times \text{AVE\_TENURE} \\
& + \beta_{11} \text{REGULATED} \times \text{AVE\_SEAT} \\
& + \gamma \text{ control variables} + \varepsilon.
\end{aligned}
$$

$$(4)$$

Earnings management indicates the level of earnings management as explained in "Dependent Variables" section. All variable measurements are explained in "Independent and Control Variables" section and summarized in Appendix as well.

Results

Univariate Analysis

Table 1 presents descriptive statistics of key variables for the final sample. Panel A of Table 1 shows that an average audit committee has four members, and on average 55 % of committee members are financial experts. On an average audit committee, 14 % of members are CEOs of other firms. An average committee member has served on the board for about nine years and holds approximately two

outside board seats. The mean (median) of earnings management measured by performance-adjusted discretionary current accruals is −0.01 (−0.01).

Table 1B contrasts key independent and control variables for two sub-samples representing firms in regulated and unregulated industries, respectively. Both mean and median values are reported. We also provide the t test for equal means and the Wilcoxon-rank sum test for equal medians between these two subsamples. Table 1B suggests that the average earnings management level is −0.01 for unregulated firms, which is significantly lower than that for regulated firms (0.00). An audit committee in a regulated firm is typically larger, possesses longer average member tenure, and fewer average member directorships compared with that in an unregulated firm. There are no significant differences in the proportion of financial experts and the proportion of outside CEO directors between regulated and unregulated firms. Also, compared to an unregulated firm, a regulated firm is more likely to have a combined leadership position, more independent directors serving on the board, a larger size, and a higher leverage ratio, and is less likely to have a blockholder or experience a loss.

Table 2 reports Pearson correlation coefficients among key variables. First, we notice that firms in regulated industries are related to higher earnings management. Consistent with our expectations, we find that audit committee size and average tenure are positively related to earnings management, whereas the ratio of financial experts on the board and average member directorships are negatively related to earnings management. These results provide preliminary support for our hypotheses. We also notice that firm size and leverage are positively related to earnings management, while leadership duality, the loss dummy variable, and big four auditors are negatively associated with earnings management.

Multivariate Regression Analysis

Table 3 presents results of multivariate regressions. The multicollinearity test results indicate that the variance inflation factors (VIF) for the independent variables and control variables are all below 2.0. Therefore, including all these variables in the same regression models will not cause a multicollinearity concern. Column 1 reports the baseline model without interaction variables, and column 2 reports the full model with interactions. First, we find that regulated industries are generally associated with higher levels of earnings management. This result is qualitatively consistent with findings of Ahmed et al. (1999), Beatty et al. (1995), and Collins et al. (1995) on the direct effect of industry regulation on earnings management.

Table 3 also indicates that the relationship between audit committee size and earnings management is positive

Table 1 Descriptive analysis

Panel A: Descriptive statistics

Variables	Mean	S.E.	Median	Lower quartile	Upper quartile
Earnings management	−0.01	0.06	−0.01	−0.03	0.02
AUDIT_SIZE	3.69	1.03	4.00	3.00	4.00
CEO_RATIO	0.14	0.19	0.00	0.00	0.25
EXPERT_RATIO	0.55	0.27	0.57	0.33	0.75
AVE_TENURE	8.68	4.17	8.00	5.67	10.75
AVE_SEATS	1.86	0.72	1.75	1.33	2.33
REGULATED	0.19	0.39	0.00	0.00	0.00
COMBINE	0.59	0.49	1.00	0.00	1.00
BOARD_INDRATIO	0.72	0.14	0.75	0.62	0.83
BLOCK_DUMMY	0.28	0.45	0.00	0.00	1.00
FIRM_SIZE	7.79	1.59	7.62	6.62	8.83
LEVERAGE	0.54	0.23	0.54	0.38	0.69
LOSS	0.12	0.32	0.00	0.00	0.00
CPA_CHANGE	0.05	0.23	0.00	0.00	0.00
BIG4	0.96	0.19	1.00	1.00	1.00

Panel B: Mean and median comparison for unregulated and regulated firms

Variables	Unregulated	Regulated	Difference	T test
	Mean (median)	Mean (median)	Mean (median)	(Rank sum test Z value)
Earnings management	−0.01	0.00	−0.01	7.04***
	(−0.01)	(−0.00)	(−0.01)	9.48***
AUDIT_SIZE	3.60	4.06	−0.46	13.98***
	(3.00)	(4.00)	(−1.00)	13.95***
CEO_RATIO	0.14	0.13	0.01	1.36
	(0.00)	(0.00)	(0.00)	1.23
EXPERT_RATIO	0.55	0.54	0.01	0.67
	(0.60)	(0.50)	(0.10)	0.80
AVE_TENURE	8.64	8.86	−0.22	1.63*
	(7.80)	(8.50)	(−0.70)	3.91***
AVE_SEATS	1.89	1.73	0.16	6.89***
	(1.75)	(1.60)	(0.048)	7.44***
COMBINE	0.58	0.64	−0.06	3.64***
	(1.00)	(1.00)	(0.00)	3.64***
BOARD_INDRATIO	0.72	0.74	−0.02	4.19***
	(0.73)	(0.75)	(−0.02)	3.64***
BLOCK_DUMMY	0.30	0.20	0.10	7.04***
	(0.00)	(0.00)	(0.00)	7.01***
FIRM_SIZE	7.48	9.13	−1.65	35.33***
	(7.33)	(9.02)	(−1.69)	31.49***
LEVERAGE	0.49	0.76	−0.27	41.26***
	(0.49)	(0.77)	(−0.26)	38.22***
LOSS	0.13	0.04	0.09	8.93***
	(0.00)	(0.00)	(0.00)	8.87***
CPA_CHANGE	0.05	0.05	0.00	0.46
	(0.00)	(−0.023)	(0.00)	0.46
BIG4	0.96	0.96	0.00	0.72
	(1.00)	(1.00)	(0.00)	0.73

Table 1 continued

Panel B: Mean and median comparison for unregulated and regulated firms				
Variables	Unregulated	Regulated	Difference	T test
	Mean (median)	Mean (median)	Mean (median)	(Rank sum test Z value)
Observations	5,044	1,195		

Both t tests for differences in means and z tests for differences in medians (in parentheses) are reported. Two-tailed tests are performed

* Significant at 10 %; ** significant at 5 %; *** significant at 1 %

but insignificant, thus H1a is not supported. Meanwhile, no significant relationship is observed in the interaction of REGULATED dummy and committee size, so H1b is not supported either.

We find a significant positive sign between outside CEO director ratio and earnings management, which supports H2a. A one-unit increase in the proportion of CEO directors is associated with 0.01-unit increase in the earnings management level. Considering the mean earnings management is −0.01 and the standard deviation 0.06, the economic effect is substantial. This result is consistent with findings of O'Reilly et al. (1988) that a higher proportion of outside CEO directors on the board is associated with inferior monitoring quality. More importantly, Table 3 also documents a significant negative sign in the interaction of REGULATED dummy and CEO_RATIO. The result indicates that the positive impact of CEO directors on earnings management is significantly weaker in a regulated industry as predicted by H2b.

We also find a significant negative relationship between the proportion of financial experts on an audit committee and earnings management, supporting H3a. A one-unit increase in the proportion of financial experts on the audit committee is associated with 0.01 unit decrease in earnings management. Again the economic significance is considerable given the mean earnings management is −0.01 and the standard deviation 0.06. This result is consistent with DeFond et al. (2005) and Xie et al. (2003) among others. However, no significant relationship is shown to support H3b that the role of financial expertise is different between regulated and unregulated industries.

We do find a significant positive relationship between average director tenure and earnings management as predicted in H4a. In addition, we find the coefficient of the interaction term between director tenure and REGULATED is negative and significant. In an unregulated industry, a 1-year increase in average director tenure is associated with a 0.001-unit increase in earnings management level. In contrast, a 1-year increase in the average director tenure is associated with 0.001 (calculated as 0.001 − 0.002) unit decrease in earnings management level in a regulated industry. H4b is thus supported. That is,

the impact of average audit committee tenure on earnings management is drastically different between regulated and unregulated firms. The average audit committee tenure increases earnings management in unregulated firms while decreases earnings management in regulated firms.

Finally, there is a significant negative relation between average directorships and earnings management, which confirms H5a. More importantly, Table 3 also presents a positive interaction effect between REGULATED and average board seats. In unregulated industries, one unit increase in the average board seat is associated with 0.003 unit reduction in earnings management. In contrast, in regulated industries one unit increase in the average board seat is associated with 0.002 (calculated as −0.003 + 0.005) unit increase in earnings management. This result supports H5b. That is, industry regulation does influence the effect of committee members' directorship on earnings management. Additional board seats increase earnings management in regulated industries but decrease earnings management in unregulated industries.

To better demonstrate the moderating role of industry regulation on the relationship between audit committee characteristics and earnings management, we provide graphical illustrations of our confirmed hypotheses, namely H2 to H5, in Figs. 1, 2, 3, and 4. All figures are drawn upon our final sample by holding all other independent and control variables at the mean values. Figure 1 indicates a positive relationship between the proportion of outside CEO directors and earnings management in an unregulated industry, while a negative relationship between these two variables is observed in a regulated industry. These results suggest outside CEO directors actually help to improve financial reporting quality and reduce earnings management in regulated firms, whereas they are associated with inferior financial reporting quality in unregulated firms. Figure 2 illustrates a negative relationship between financial expertise ratio and earnings management in both regulated and unregulated industries. The elasticity difference between these two types of industries is negligible, however. Figure 3 shows that average audit committee tenure increases earnings management in unregulated industries, but decreases earnings management in regulated industries

Table 2 Correlation matrix for key variables

Variables	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]
Earnings management (1)	1.00														
REGULATED (2)	0.09*	1.00													
AUDIT_SIZE (3)	0.04*	0.17*	1.00												
CEO_RATIO (4)	0.01	-0.02	0.08*	1.00											
EXPERT_RATIO (5)	-0.04*	-0.01	-0.02	0.39*	1.00										
AVE_TENURE (6)	0.03*	0.02	-0.03	-0.07*	-0.04*	1.00									
AVE_SEATS (7)	-0.03*	-0.09*	0.12*	0.09*	0.03*	-0.10*	1.00								
COMBINE (8)	-0.04*	0.05*	0.08*	0.09*	0.02	0.01	0.03*	1.00							
BOARD_RATIO (9)	0.02	0.05*	0.24*	0.01	0.03*	-0.14*	0.15*	0.09*	1.00						
BLOCK_DUMMY (10)	0.01	-0.09*	-0.17*	-0.04*	-0.02	0.09*	-0.11*	-0.08*	-0.37*	1.00					
FIRM_SIZE (11)	0.05*	0.41*	0.34*	0.11*	0.07*	0.01	0.28*	0.14*	0.14*	-0.19*	1.00				
LEVERAGE (12)	0.09*	0.46*	0.27*	0.05*	0.01	-0.03*	0.09*	0.11*	0.17*	-0.14*	0.52*	1.00			
LOSS (13)	-0.12*	-0.11*	-0.07*	-0.01	-0.02	-0.04*	0.01	-0.04*	-0.00	-0.01	-0.15*	-0.09*	1.00		
CPA_CHANGE (14)	0.02	0.01	-0.03*	0.01	-0.01	0.00	-0.03*	0.01	0.04*	0.05*	-0.09*	-0.02	0.03*	1.00	
BIG4 (15)	-0.05*	0.01	0.07*	0.04*	0.04*	-0.05*	0.10*	0.04*	0.08*	-0.13*	0.16*	0.07*	-0.02	-0.19*	1.00

* Significant at the 5 % level or above

as predicted in H4a and H4b. Finally, Fig. 4 suggests that average member directorship decreases earnings management in unregulated industries but increases earnings management in regulated industries, which supports both H5a and H5b.

Table 4 presents multivariate regression results by splitting our sample between unregulated and regulated firms. We use seemingly unrelated estimations to compare predictor variables across these two different samples, i.e., unregulated industries versus regulated industries. This method tests for differences in the size of the coefficients for the same variable across regression models by calculating a single, simultaneous covariance matrix. Column 1 reports coefficients of unregulated firms; column 2 reports coefficients of regulated firms; and column 3 reports χ^2 test results on equal coefficients between these two groups. Table 4 shows a significant difference between unregulated and regulated firms in the relationships between outside CEO director ratio and earnings management. A higher proportion of CEO directors increases earnings management in unregulated firms, while it decreases earnings management in regulated firms. Table 4 also indicates that the proportion of financial experts has a significant negative impact on earnings management in unregulated firms, while no such relationship is observed for regulated firms in the split-sample test. This difference, however, is not statistically significant. We also find that audit committee average tenure increases earnings management in unregulated firms, while it decreases earnings management in regulated firms. Finally, Table 4 indicates that external directorship has a significant negative impact on earnings management in unregulated firms, but such a relationship is not significant in regulated firms. Again, a statistically insignificant difference is identified between these two subsamples. Overall, Table 4 confirms our main prediction that industry regulation does play a significant moderating role in the relationship between audit committee characteristics and earnings management.

Additional Analysis

The accounting literature suggests that different measures of earnings management may change empirical results. Therefore, we employ an alternative measure of earnings management as a sensitivity test. We use current abnormal accruals calculated based on the modified Jones model as another proxy of earnings management (Jones 1991; Xie et al. 2003) and denote this measure as "Earnings Management-Alternate".[2] We replicate our main test in

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[2] The major difference between our main measure of earnings management, the performance adjusted discretionary current accrual method, and this alternative measure is that this alternative estimation does not control for firm performance. Please refer to Xie et al. (2003) for detailed explanation and calculation of this measure.

Table 3 The impact of audit committee and industry regulation on earnings management

	Baseline	Interactions
Regulated	0.006***	0.020*
	(0.002)	(0.010)
Audit_size [H1a]	0.001	0.001
	(0.001)	(0.001)
Ceo_ratio [H2a]	0.007*	0.010**
	(0.004)	(0.004)
Expert_ratio [H3a]	−0.011***	−0.011***
	(0.003)	(0.004)
Ave_tenure [H4a]	0.000*	0.001***
	(0.000)	(0.000)
Ave_seats [H5a]	−0.002*	−0.003***
	(0.001)	(0.001)
Regulated*audit_size [H1b]		0.000
		(0.001)
Regulated*ceo_ratio [H2b]		−0.014*
		(0.007)
Regulated*expert_ratio [H3b]		−0.001
		(0.008)
Reguated*ave_tenure [H4b]		−0.002***
		(0.000)
Regulated*ave_seats [H5b]		0.005**
		(0.002)
Combine	0.007	0.007
	(0.006)	(0.006)
Board_indratio	0.003**	0.003**
	(0.002)	(0.002)
Block_board	0.002	0.003
	(0.002)	(0.002)
Firm_size	−0.001	−0.001
	(0.001)	(0.001)
Leverage	0.023***	0.025***
	(0.005)	(0.005)
Loss	−0.024***	−0.024***
	(0.003)	(0.003)
Cpa_change	0.004	0.004
	(0.004)	(0.004)
Big4	−0.015***	−0.014***
	(0.005)	(0.005)
Year dummy	Included	Included
Constants	−0.005	−0.007
	(0.008)	(0.008)
Observations	6,239	6,239
Adjusted R square	0.035	0.039

Robust standard errors are reported in parentheses. All models include year controls, which are not reported

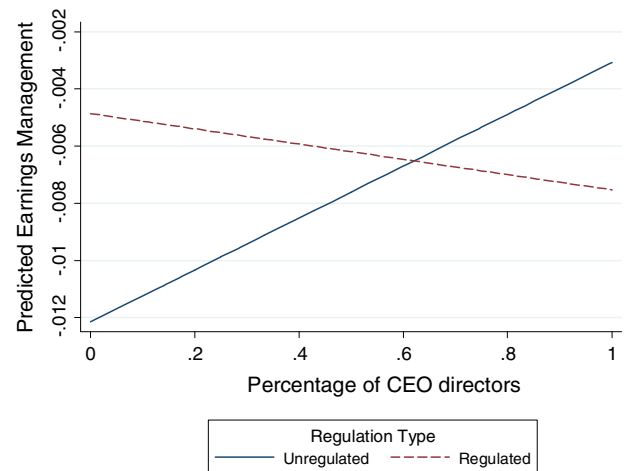* Significant at 10 %, ** significant at 5 %, *** significant at 1 %

Fig. 1 The relationship between the proportion of CEO directors and earnings management in regulated versus unregulated industries
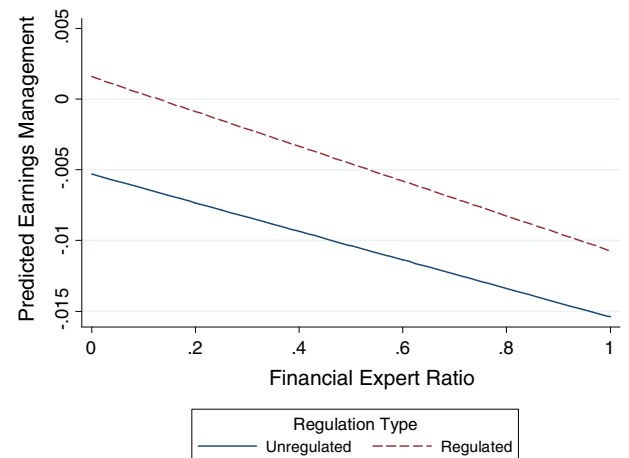

Fig. 2 The relationship between financial expert ratio and earnings management in regulated versus unregulated industries
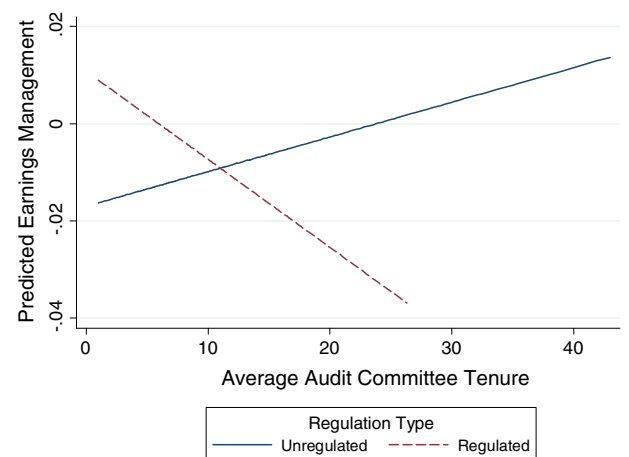

Fig. 3 The relationship between audit committee tenure and earnings management in regulated versus unregulated industries
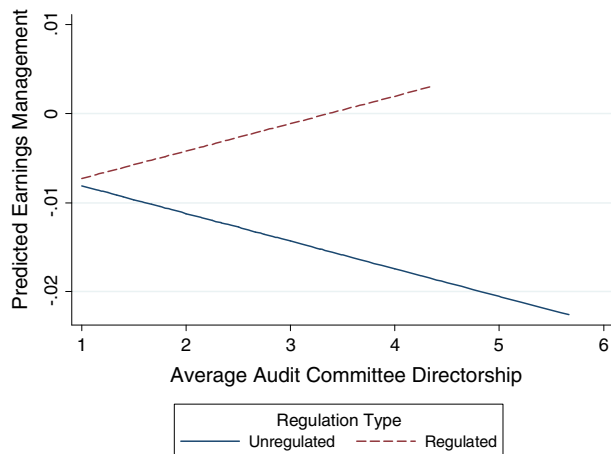
Fig. 4 The relationship between audit committee directorship and earnings management in regulated versus unregulated industries

Table 3 using this alternative measure and report our results in Table 5. Table 5 shows that the proportion of CEO directors on the audit committee significantly increases earnings management in unregulated firms, while it significantly decreases earnings management in regulated firms, which supports H2a and H2b. Table 5 also suggests that the proportion of financial experts on the committee is related to significantly lower earnings management level as predicted by H3a. No statistically significant difference is observed between regulated and unregulated firms. In addition, average tenure is significant and positively associated with earnings management in unregulated firms and negatively associated with earnings management in regulated firms, which confirms H4 a and H4b. Finally, a significantly negative association is documented between average directorship and earnings management in unregulated firms, while a significantly positive sign is identified for regulated firms. H5a and H5b are supported as well. Overall, these results are consistent with our main results estimated using the performance-adjusted discretionary current accrual method.

The accounting literature suggests the income-increasing accruals that result in higher future earnings and income-decreasing accruals that lead to lower future earnings possess different characteristics, thus shaping the effectiveness of monitoring by boards and audit committees in a different way (Palmrose et al. 2004). To explore this hypothesis, we split our samples into positive and negative accruals. We expect that the moderating role of industry regulation may be different, when restricting earnings management associated with income-increasing (positive) versus income-decreasing (negative) accruals. The first column of Table 6 reports regression results associated with positive accruals, and the second column reports results associated with negative accruals.

Table 4 The impact of audit committees on earnings management in regulated versus unregulated firms

	Unregulated	Regulated	Chi-square difference
Audit_size	0.001	0.000	0.26
	(0.001)	(0.001)	
Ceo_ratio	0.012***	−0.012*	8.10***
	(0.005)	(0.007)	
Expert_ratio	−0.011***	−0.009	0.06
	(0.004)	(0.007)	
Ave_tenure	0.001***	−0.002***	25.22***
	(0.000)	(0.000)	
Ave_seats	−0.002*	−0.003	0.12
	(0.001)	(0.002)	
Combine	0.004**	0.001	0.85
	(0.002)	(0.003)	
Board_indratio	0.006	0.008	0.01
	(0.007)	(0.010)	
Block_board	0.002	0.006	0.67
	(0.002)	(0.004)	
Firm_size	−0.003***	0.006***	29.88***
	(0.001)	(0.001)	
Leverage	0.026***	0.004	2.54
	(0.005)	(0.013)	
Loss	−0.026***	0.004	8.11***
	(0.004)	(0.010)	
Cpa_Change	0.003	0.007	0.16
	(0.004)	(0.008)	
Big4	−0.010**	−0.032***	3.10*
	(0.005)	(0.011)	
Year dummy	Included	Included	
Constants	−0.000	−0.005	
	(0.009)	(0.018)	
Observations	5,044	1,195	
Adjusted R square	0.034	0.074	87.85***

Robust standard errors are reported in parentheses. All models include year controls, which are not reported

* Significant at 10 %, ** significant at 5 %, *** significant at 1 %

In terms of positive earnings management, we find that having more CEO directors on an audit committee helps to reduce positive accruals, while no statistically significant difference is observed between regulated and unregulated firms. In addition, industry regulation has a significant moderating effect on the relationship between the proportion of financial experts and earnings management. The financial expert ratio significantly reduces positive accruals in regulated industries, while no significant effect is observed in unregulated industries. We also find a significant and negative coefficient on the interaction of

Table 5 The impact of audit committee and industry regulation on earnings management: alternative accrual measure

	Baseline	Interactions
Regulated	−0.002	0.011
	(0.002)	(0.011)
Audit_size [H1a]	0.000	0.000
	(0.001)	(0.001)
Ceo_ratio [H2a]	0.006	0.009**
	(0.004)	(0.005)
Expert_ratio [H3a]	−0.009**	−0.009**
	(0.003)	(0.004)
Ave_tenure [H4a]	0.000*	0.001***
	(0.000)	(0.000)
Ave_seats [H5a]	−0.004***	−0.005***
	(0.001)	(0.001)
Regulated*audit_size [H1b]		−0.001
		(0.002)
Regulated*ceo_ratio[H2b]		−0.021**
		(0.008)
Regulated*expert_ratio [H3b]		0.003
		(0.009)
Reguated*ave_tenure [H4b]		−0.002***
		(0.001)
Regulated*ave_seats [H5b]		0.005**
		(0.002)
Combine	0.004	0.004
	(0.006)	(0.006)
Board_indratio	0.002	0.002
	(0.002)	(0.002)
Block_board	0.003	0.003
	(0.002)	(0.002)
Firm_size	0.001	0.001
	(0.001)	(0.001)
Leverage	0.028***	0.030***
	(0.005)	(0.005)
Loss	−0.027***	−0.027***
	(0.004)	(0.004)
Cpa_change	0.007*	0.007
	(0.004)	(0.004)
Big4	−0.013**	−0.012**
	(0.005)	(0.005)
Year dummy	Included	Included
Constants	−0.007	−0.009
	(0.008)	(0.009)
Observations	6,085	6,085
Adjusted R Square	0.039	0.043

Robust standard errors are reported in parentheses. All models include year controls, which are not reported

* Significant at 10 %, ** significant at 5 %, *** significant at 1 %

Table 6 The impact of audit committee and industry regulation on earnings management: positive vs. negative accruals

	Positive accruals	Negative accruals
Regulated	0.019	0.014
	(0.014)	(0.008)
Audit_size [H1a]	0.001	0.001
	(0.001)	(0.001)
Ceo_ratio [H2a]	−0.009*	0.007
	(0.005)	(0.004)
Expert_ratio [H3a]	0.002	−0.009***
	(0.005)	(0.003)
Ave_tenure [H4a]	0.000	0.001***
	(0.000)	(0.000)
Ave_seats [H5a]	0.000	−0.003**
	(0.001)	(0.001)
Regulated*audit_size [H1b]	0.000	0.001
	(0.002)	(0.001)
Regulated*ceo_ratio [H2b]	0.011	−0.008
	(0.008)	(0.008)
Regulated*expert_ratio [H3b]	−0.026**	0.007
	(0.010)	(0.009)
Reguated*ave_tenure [H4b]	−0.002***	−0.001**
	(0.001)	(0.000)
Regulated*ave_seats [H5b]	0.004	−0.000
	(0.002)	(0.002)
Combine	−0.007	0.007
	(0.007)	(0.006)
Board_indratio	0.006***	0.002
	(0.002)	(0.002)
Block_board	0.004*	−0.001
	(0.002)	(0.002)
Firm_size	−0.004***	0.003***
	(0.001)	(0.001)
Leverage	0.012**	0.005
	(0.006)	(0.005)
Loss	0.001	−0.038***
	(0.003)	(0.004)
Cpa_change	0.003	0.000
	(0.004)	(0.004)
Big4	−0.008	−0.002
	(0.005)	(0.005)
Year dummy	Included	Included
Constants	0.063***	−0.065***
	(0.009)	(0.008)
Observations	2,581	3,658
Adjusted R square	0.045	0.108

Robust standard errors are reported in parentheses. All models include year controls, which are not reported

* Significant at 10 %, ** significant at 5 %, *** significant at 1 %

regulation and average committee tenure, which indicates average audit committee tenure significantly reduces positive earnings management in regulated industries, while no such effect is observed for unregulated firms.

In terms of negative earnings management, we find having more financial experts on the committee significantly reduces negative accruals, while no statistically significant difference is observed between regulated and unregulated firms. In addition, audit committee member tenure has a significant positive impact on the level of negative accruals in unregulated industries, while a significant negative impact in regulated industries is observed. Moreover, average committee directorship significantly reduces negative accruals, while no significant difference is observed between regulated and unregulated firms. Overall, our results suggest that the function of audit committees may be different in controlling income-increasing and income-decreasing accruals. It seems that the direct effect of audit committees is more salient for negative earnings management and the moderating role of regulation is more prominent in reducing income-increasing accruals than income-decreasing accruals.

Finally, we conduct additional analysis to examine whether the role of audit committees varies under different regulatory environments. For example, financial institutions such as banks face a different type of regulatory pressures than other types of regulated industries (Flannery 1994). Because of this, we single out financial institutions and banking industries (SIC code 6000s) and compare the role of audit committees in these firms with unregulated firms. Our main results remain the same in our untabulated table. We choose to report the full sample including all regulated firms for a larger sample size and stronger testing power.

Discussions and Conclusions

Does industry regulation matter? Our paper investigates the moderating role of industry regulation on the relationship between audit committee characteristics and earnings management. Using comprehensive panel data of S&P 1500 firms during the post-SOX period of 2003–2007, our answer to this question is "yes." Specifically, we find that the proportion of outside CEO directors on an audit committee is associated with higher levels of earnings management in unregulated industries, but this relationship is weaker and turns negative in regulated industries. We also find that the ratio of financial experts on an audit committee is negatively associated with earnings management. We document that average audit committee tenure is negatively associated with earnings management in regulated industries, but has a positive impact on earnings management in unregulated industries. In addition, average directorship of an audit committee has a

negative impact on earnings management in unregulated firms, but positively influences earnings management in regulated industries.

First of all, our research suggests that audit committee characteristics have a significant impact on financial reporting quality as reflected in the level of earnings management. Our results are consistent with prior empirical literature in this regard and echo the comment of Arthur Levitt, the former chairman of SEC, that "Qualified, committed, independent, and tough-minded audit committees represent the most reliable guardians of the public interest (Levitt 1999)."

More importantly, our study has highlighted the importance of contextual factors, especially industry regulation, in shaping the effectiveness of an audit committee. Prior research has shown that industry regulation has a profound influence on firms' competitive environment, operation complexity, governance structures, and managerial discretion (Becher et al. 2005; Kole and Lehn 1999). As Becher and Frye (2011) put it, "governance is affected by the presence of regulators even if they do not directly dictate monitoring levels." We contribute to this stream of literature by providing additional insights into the role of industry regulation on the relationship between corporate governance mechanisms and financial reporting quality. Our results suggest that industry regulatory contexts impose different requirements on boards and audit committees, thus influencing the effect of an audit committee in constraining earnings management.

Our findings thus help to explain a gap in the extant literature when it comes to finding a consistent effect of "best practice" corporate governance structures in financial reporting quality (see review of Cohen et al. 2004; Dechow et al. 2010). We argue that this is partially due to the "undercontextualized" nature of these studies, which rely on universalistic models of efficiency that abstract away from important organizational and environmental complexities (Aguilera et al. 2008). Actually, a recent study by Larcker et al. (2007) also raises the same point. They suggest that regulatory change, such as the implementation of the SOX, may cause firms to adopt greater conformity in governance mechanisms, thus reducing the power of statistical tests and causing certain factors such as audit committee independence and expertise level to matter more in the pre-SOX period than in the post-SOX period. Our study suggests that not only the general regulatory context matters, but specific industry-wide regulations also shape the effectiveness of corporate governance mechanisms.

The results of this study should be interpreted within the context of the following limitations. First, because of the pooled cross-sectional nature of our sample, caution should be taken when making causal inference statements from our results. For example, Huang et al. (2008) indicate that top management may have discretion to manage earnings and to change board and audit committee structures as well. As a

result, managerial discretion may become an omitted variable in the relationship between audit committee characteristics and earnings management. This prediction thus suggests that top management may choose to send different signals to the market as a response to various requirements imposed by regulated and unregulated industries. Consequently, our results might indicate a self-selected management effect in regulated and unregulated industries.

Another limitation of our study is that we treat all regulated industries as the same and study them indistinguishably. However, because types of regulation differ between industries, the role of audit committees may also vary with these different regulatory environments. Our sensitivity analysis of isolating the financial industry provides the first step to investigate a more nuanced industry environment. A better approach would be to utilize the case study method suggested by Aguilera et al. (2008) to gain in-depth understanding of specific industrial contexts or respond to advocates of Davis and Marquis (2005) to use a field-level approach to investigate the impact of common institutional environments facing these regulated industries when boundaries around these industries are ambiguous.

Our study also indicates some future research avenues. First, apart from industry regulation studied in our paper, effectiveness of a corporate governance system is also influenced by other organizational contexts. Filatotchev and Wright (2005) and Filatotchev and Allock (2010), for example, suggest that the stage of organizational life cycle influences efficacy of corporate governance systems. As firms evolve over the life cycle, the effectiveness of corporate governance may shift in the balance between accountability roles versus resource and entrepreneurial roles. From this perspective, it is worthwhile for future corporate governance research to incorporate industry life cycle or other additional contextual factors in studying the effectiveness of corporate governance mechanisms. That is, research should adopt an open-system approach that treats organizational characteristics as "being interdependent with the diversity, fluctuations, and uncertainties of their environment" (Filatotchev and Allock 2010). This approach we argue will not only benefit corporate governance research but also provide more useful information and guidance to regulators when formulating guidelines and policies that influence their constituent firms.

Second, our study is built on the shareholder view of the firm that emphasizes the essential role of maximizing shareholder value. The stakeholder theory recognizes that the effectiveness of corporate governance is dependent on a wider set of stakeholders that interact with the firm, including employees, public officials, suppliers, and customers (Freeman 1984). We expect that industry regulation may also have profound influence on the effectiveness of stakeholders in protecting their interests in the firm. For example, Luoma and

Goodstein (1998) find that board representation of key stakeholders is more likely in larger firms or firms in highly regulated industries. Future research could also benefit by investigating how internal and external corporate governance mechanisms may go beyond shareholders to impact a larger group of stakeholders.

Moreover, financial reporting quality is not just a matter of compliance with various governance regulations, but an ethical issue (Kaplan 2001; Staubus 2005). Archival data used in our analysis are not able to capture ethically related judgments of individual board members, audit committee members, and managers. Future research could follow such works as Elias (2002), Kaplan (2001), Kaplan et al. (2007), Greenfield et al. (2008), Almer et al. (2008) and Ng et al. (2009) by utilizing a survey method to collect detailed ethical judgment information of board members and management teams so as to better understand ethical reasoning behind their decisions. More importantly, as He and Ho (2011) argue, managerial ethics may actually supplement the need for expensive internal monitoring mechanisms. Studying the interplays between managers' ethical judgment and corporate governance arrangements would undoubtedly complement our paper and be another fruitful future research avenue.

Overall, our paper provides the first evidence of the impact of industry regulation on the effectiveness of audit committees in constraining earnings management. Our results suggest that the effectiveness of an audit committee is influenced by institutional and contextual factors. As Powell (1996) advocates, organizational studies should "tackle the harder and more interesting issues of how they (institutions) matter, under what circumstances, to what extent, and in what ways." We hope our study will stimulate further research in this aspect.

Appendix

See Table 7.

Table 7 Variable definitions

Earnings management	Performance-adjusted discretionary current accruals. Method is specified in the text
AUDIT_SIZE	The size of audit committees
CEO_RATIO	The proportion of CEO directors (CEOs of other firms) sitting on the committee
EXPERT_RATIO	The proportion of financial experts on the committee
AVE_TENURE	The average of all audit committee members' tenure
AVE_SEAT	The average of all audit committee members' external directorships

Table 7 continued

REGULATED	One if SIC code = 4900–4939 (electric and gas), 1300 (oil and gas extraction), 4000–4700 (transportation), 4800 (telecommunications), 4950–4959 (sanitary services) and all 6000s (financial companies); zero otherwise
COMBINE	One if the CEO is also the chairperson of the board, zero otherwise
BOARD_INDRATIO	The proportion of independent directors on the board
BLOCK_BOARD	One if there is a blockholder (a shareholder with 5 % of larger equity holdings), zero otherwise
FIRM_SIZE	Log value of net assets at the beginning of the year
LEVERAGE	Debt to equity ratio calculated as long-term debt divided by total equity at the beginning of year t
LOSS	One if a firm's net income is less than zero at the beginning of year t; zero otherwise
CPA_CHANGE	One if a firm changes its auditor compared to previous year, zero otherwise
BIG4	One if a firm's auditor is one of the Big4 auditing firms at the beginning of the year t; zero otherwise

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