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The Effects of SOX and Internal Control Weaknesses on the Relation between the Real Earnings Management and Audit Fees

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Abstract

This study investigates whether the positive relation between the real earnings management (REM) and audit fees reported by Choi et al. (2016) differs before and after the Sarbanes-Oxley Act (SOX), and varies cross-sectionally depending on the existence of internal control problems. Using a large sample of U.S. firms, we find that the positive relation between REM and audit fees is stronger than the same relation between AEM and audit fees in the post-SOX period, whereas the opposite is true in the pre-SOX period. We also find that the positive relation between REM and audit fees is intensified for firms with material internal control weaknesses.

Keywords: real earnings management; audit fees; SOX; internal control weakness
JEL classification: M41, M42

1. Introduction

Choi et al. (2016) report that auditors charge higher audit fees to their client firms which engage in a more extensive level of real earnings management, and that this effect is incremental to the similar effect by the accrual-based earnings management. This study investigates whether this positive relation between the real earnings management and audit fees differs before and after the Sarbanes-Oxley Act (SOX), and varies cross-sectionally depending on the existence of internal control weaknesses.

Theory and evidence indicate that managers' concerns over current performance motivate them

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to engage in manipulating current-period earnings at the expense of future-period earnings (e.g., Fudenberg and Tirole, 1995; Graham et al., 2005; Healy and Wahlen, 1998; Pauwels et al., 2004; Stein, 1989). Current-period reported earnings can be managed in two different ways. First, managers can manipulate reported earnings through discretionary accrual choices that are allowed under Generally Accepted Accounting Principles (GAAP). While this accrual-based earnings management (hereafter AEM) directly influences the amount of accounting accruals, AEM has no direct effect on cash flows. Second, managers can also manipulate reported earnings by adjusting real activities. Specifically, they can alter the timing and scale of real activities such as sales, production, investment, and financing activities in such a way that a specific earnings target can be met. For example, reported earnings can be temporarily boosted by accelerating the timing of production and sales schedules, by cutting discretionary expenditures, and/or by deferring the timing of their occurrences. Following Roychowdhury (2006), these real operation adjustment activities that deviate from normal business practices with the primary objective of manipulating current-period earnings are referred to as real earnings management (hereafter REM). Unlike AEM, REM can have direct consequences on current and future cash flows (as well as accounting accruals), are more difficult for average investors to understand, and are normally less subject to external monitoring and scrutiny by auditors, regulators, and other outside stakeholders (Cohen et al., 2008). While AEM only affects accrual numbers, REM boosts short-term earnings at the expense of distorting real operations (Roychowdhury, 2006); it causes real operations to deviate from their optimal levels, thereby dampening a firm's ability to generate future cash flows in the long run (Kim and Sohn, 2013).

AEM is related to higher audit fees because, to the extent that it reflects managers' opportunism, it is not realized in the future and is associated with assessments of higher inherent risks by auditors (Gul et al., 2003). REM is also positively associated with audit fees because it increases the risk of shareholder litigations against auditors (Choi et al., 2016). If managers use REM in addition to AEM, and the extent of stock price boosting is thus greater than when they use only AEM, shareholders are more likely to sue auditors by holding them responsible for failing to detect and deter so-called AEM. Because auditors know this risk increase due to REM, they have incentives to be compensated for REM in the form of higher audit fees. In addition to the increase in shareholder litigation risks posited in Choi et al. (2016), we hypothesize that auditors charge higher audit fees for their client firms engaging in more extensive REM because REM increases the amount of resources to detect AEM. In the process of verifying their client firms' compliance with GAAP and detecting AEM (which are auditors' main duty), auditors need to put more resources to firms that engage in more extensive REM because the reported earnings are more "contaminated" by various real operation manipulation activities. That is, the effects of AEM and REM are entangled in

distorting reported earnings, thereby making AEM detection more difficult and resource-consuming. Consequently, auditors demand higher audit fees to recover these costs.

We expect that this positive relation between REM and audit fees differs in the pre- and post-SOX periods. Before SOX, the firms' cost of conducting AEM was relatively low. Therefore, it was pervasive in many firms. In contrast, REM was not as common as AEM, and auditors did not understand it comprehensively. As a result, auditors paid more attention to detecting and deterring AEM rather than REM, and charged higher audit fees on firms conducting more extensive AEM. After SOX was enacted in 2002, however, the relative cost of AEM has increased significantly due to the heightened regulatory scrutiny and/or additional certification requirements. In response, firms have switched from AEM to REM to manipulate reported earnings in the post-SOX period (Cohen et al., 2008). We posit that auditors also have stronger incentives to understand and detect REM which has become more pervasive in this period. Given that REM is a more serious value-destroying earnings management method, they will charge higher audit fees on firms with more extensive REM once they detect it, and this penalty will be more severe in the post-SOX period when they better understand REM.

We also expect that the positive relation between REM and audit fees is more pronounced for firms with material internal control problems. Prior literature documents that auditors increase audit fees for their client firms that report material internal control weaknesses (ICW hereafter) under the Section 404 of SOX (Hogan and Wilkins, 2008; Hoitash et al., 2008; Raghunandan and Rama, 2006). REM dampens firms' long-term fundamentals and cash flow generating abilities by making firm operations deviate from their optimal levels. This detrimental effect of REM may be more critical for firms with serious internal control problems because it takes more time for auditors and investors to detect REM from the reported earnings in financial statements if an efficient internal control system cannot prevent managers from conducting excessive REM to inflate reported earnings. To be compensated for this additional audit effort and risk, therefore, auditors have an incentive to charge a higher level of audit fees per unit of detected REM if their client firms have internal control weaknesses.

Regressing the natural log of audit fees on the proxies for AEM and REM, and other audit fee determinants for the period 2000-2008, we find that REM is significantly positively related to audit fees, and this relation is incremental over and beyond the effects of AEM and other control variables, which confirms the finding in Choi et al. (2016). We also find that the positive relation between REM and audit fees is stronger than the same relation between AEM and audit fees in the post-SOX period, whereas the opposite is true in the pre-SOX period. Finally, we find that the positive relation between REM and audit fees is intensified for firms with internal control problems. These findings are robust to various sensitivity tests.

This study contributes to extant literature on the real earnings management and auditing in several ways. First, this study extends Choi et al. (2016) by investigating the differential effect of REM on audit fees in different timing or cross-sections. We find that the audit-fee-increasing effect of REM reported in Choi et al. (2016) is more pronounced after SOX because of firms' pervasive switches from AEM to REM and auditors' better understanding for this behavior in the post-SOX period. We also find that the effect of REM on audit fees is intensified for firms with internal control problems. By this extension, this paper makes the research on the relation between REM and audit fees more complete. Second, this study complements the research on differential earnings management choices before and after SOX. Prior studies document that firms have switched from AEM to REM after SOX due to the increased cost of AEM (Cohen et al., 2008; Cohen and Zarowin, 2010). We report that the auditors also understand this change in their client firms' earnings management method choices and incorporate it into their audit fee determinations. This finding sheds light on the study for the interaction between auditors and client firms with regard to earnings manipulations.

Third, the findings in this paper have important policy implications. Given that REM deteriorates earnings quality but weak internal control systems cannot fully prevent this phenomenon, and that auditors understand this relation and react with increased audit fees, regulators who are concerned with the quality of reported earnings should understand this dynamics, and take it into account when setting financial reporting, internal control, and auditing policies.

The paper proceeds as follows. Section 2 reviews extant literature and develops our research hypotheses; Section 3 explains variable measurement and specifies the empirical model; Section 4 describes the sample and data and presents main empirical results; Section 5 performs sensitivity tests; and Section 6 concludes the paper.

2. Related research and hypothesis development

2.1. Research on audit fees and earnings management

Simunic (1980) identifies demand-side major determinants of audit fees and categorizes them into three distinct groups: auditee size, operation complexity, and inherent audit risk. He documents that the level of audit fees increases in client firms' size, operation complexity, and inherent audit risk because more quantity of resources are required for auditors to perform the audit examination, and auditors are exposed to larger possible litigation risks when auditing larger, more complex, and riskier firms. After controlling for these three groups of fee determinants, subsequent studies explore a variety of additional audit fee determinants including auditor size,

non-audit services, auditor change, auditor change direction, auditor brand name and industry specialization, client satisfaction, client risks, client bargaining power, audit committee characteristics, internal control quality, SOX passage, cross-listing and country's legal regimes, education requirement for new accountants, and audit market competition (Abbott et al., 2003; Allen and Woodland, 2010; Ashbaugh et al., 2003; Behn et al., 1999; Chaney et al., 2004; Choi et al., 2009; Craswell et al., 1995; Craswell and Francis, 1999; Francis and Simon, 1987; Hay et al., 2006; Hay and Knechel, 2010; Hogan and Wilkins, 2008; Huang et al., 2007, 2009; Johnstone and Bedard, 2001; Palmrose, 1986a, 1986b; Simon and Francis, 1988; Whisenant et al., 2003, among others).

The studies on the relation between earnings management and audit fees are relatively scarce and only concerned with AEM.[1] Gul et al. (2003) document empirical evidence that audit fees increase in the level of unsigned discretionary accruals. They argue that this is because, to the extent that discretionary accruals proxy for managerial opportunism, they provide managers with a means of managing reported earnings to their advantage (Healy, 1985), and because accruals are associated with high-risk accounts such as accounts receivable and inventories (Kreutzfeldt and Wallace, 1986; Willingham and Wright, 1985). Abbott et al. (2006) report that the impact of discretionary accruals on audit fees is positive in the magnitude of income-increasing but negative in the magnitude of income-decreasing accruals due to the asymmetric litigation risks for auditors. Antle and Gordon (2006) report a negative relation between audit fees and their measure of signed discretionary accruals, which is inconsistent with Abbott et al. (2006).

2.2. Research on REM

Roychowdhury (2006) has developed empirical models that allow researchers to separate the normal levels of real operational activities as reflected in cash flows from operations (CFO), production costs, and discretionary expenditures from their abnormal levels. His analysis shows that managers engage in real activities manipulation to meet certain earnings targets. Since Roychowdhury's work, subsequent studies dealing with REM issues have provided evidence supporting that, while the expected, normal levels of real activities are associated with optimal operational decisions, their unexpected, abnormal levels capture managerial opportunism to interfere with a transparent financial reporting process.

One strand of previous REM research has focused on whether managers use REM as a substitute or complement for AEM when making strategic decisions on the timing and magnitude of earnings manipulation. For example, Cohen et al. (2008) examine the impact of the SOX passage

1) Frankel et al. (2002), Ashbaugh et al. (2003), and Srinidhi and Gul (2007) examine this relation in an opposite direction to our paper, that is, the effect of audit fees (and non-audit fees) on earnings management.

on managerial choice between AEM and REM. They document that firms were heavily involved in AEM in the pre-SOX period but their involvement in AEM declined significantly after the passage of SOX. Their finding shows that the passage of SOX motivates firms to switch from AEM to REM. This substitution occurs for the following reasons. Compared with AEM, REM is harder for external auditors, regulators, and other stakeholders to detect. Further, expected legal liability costs associated with AEM increase significantly in the post-SOX environment due to heightened financial reporting regulations and additional certification requirements, while the same costs associated with REM do not. As a result, REM becomes (relatively) less costly in the post-SOX period than AEM. The above evidence is consistent with the analytical results of Ewert and Wagenhofer (2005) who demonstrate that managers switch from AEM to REM in an environment of tightened accounting standards or more stringent enforcements. Survey results of Graham et al. (2005) also reveal that the large majority of managers are willing to delay the timing of new investment projects to meet a certain earnings target even when such a deferment has adverse implications on long-term value. A subsequent study by Cohen and Zarowin (2010) investigates the relative intensity of AEM and REM around seasoned equity offerings (SEOs), i.e., during the period in which managers have relatively high incentives to artificially inflate current-period earnings. Consistent with Cohen et al. (2008), they also find that SEO firms have substituted REM for AEM in the post-SOX period as SOX has made AEM more costly than REM. Zang (2012) investigates the substitution between AEM and REM depending on their relative costs and documents that firms with high costs of AEM (REM) and low costs of REM (AEM) increase REM (AEM) and decrease AEM (REM). The above results, taken as a whole, suggest that managers take into account potential costs and benefits associated with their choice between AEM and REM.

While the primary concern of the aforementioned studies is with the trade-off relation between AEM and REM as a means to meet earnings management objectives, the other strand of REM research focuses on economic consequences of REM. For example, Gunny (2010) finds that firms' future profitability is higher when they use REM to meet or just beat analysts' forecasts, implying that REM plays a signaling role. Using a sample of SEO firms, Mizik and Jacobson (2007) find that to temporarily inflate stock prices at the time of SEOs, managers engage in boosting reported earnings via cutting marketing expenses, but in the long run, such managerial myopia leads to a decline in stock market performance. Kim and Sohn (2013) predict and find that the cost of equity capital increases with firms' REM as well as AEM activities.

Studies on the association between REM and audit fees are in dearth. An exception is Choi et al. (2016). Using a large sample of U.S. firms, they find that auditors charge higher audit fees to their client firms with more extensive REM. This is because REM increases the risk of shareholder litigation against auditors: The extent of stock price boosting is greater when firms engage in both

REM and AEM than they do only AEM, and thus shareholders suffer from a larger size of losses when stock prices fall to a greater extent subsequently. We extend Choi et al. (2016) by exploring the temporal difference of audit-fee-increasing effect of REM before and after SOX.

2.3. Research on ICW

There are many studies that investigate the causes and effects of ICW. Studies that look into the determinants of ICW include Ashbaugh-Skaife et al. (2007), Doyle et al. (2007a), and Ge and McVay (2005), in which they find that firms with smaller size, more complex operations, recent changes in organizational structures, financial distress, and less investment in internal control systems are more likely to have weak internal controls. Choi et al. (2013) report that the propensity of ICW disclosures decreases with the investment in internal-control-related human resources.

Other studies investigate the consequences of internal control weaknesses or the disclosure of their existence. For example, ICW increases cost of equity (Ashbaugh-Skaife et al., 2009; Gordon and Wilford, 2012); cost of private debt (Costello and Wittenberg-Moerman, 2011; Kim et al., 2011) and public debt (Dhaliwal et al., 2011). Internal control quality is positively related to financial reporting conservatism (Goh and Li, 2011), and insider trading profits are higher in ICW firms (Skaife et al., 2013). ICW also increases managerial compensation and turnover (Wang, 2010), and exacerbates firms' investment and operating efficiencies (Cheng et al., 2013; Feng et al., 2012). Stock prices decline at the time of ICW disclosures (Beneish et al., 2008; Hammersley et al., 2008; Ogneva et al., 2007), and ICW decreases the accuracy of management guidance (Feng et al., 2009).

Most close to our study, Hogan and Wilkins (2008), Hoitash et al. (2008), and Raghunandan and Rama (2006) report that auditors charge higher audit fees to ICW firms. Doyle et al. (2007b) find that ICW is positively associated with the magnitude of AEM, and Ashbaugh-Skaife et al. (2008) document that the negative relation between ICW and accruals quality is due to unintentional errors, and that accruals quality increases when ICW is remediated. We extend this line of research by investigating whether ICW intensifies the positive relation between REM and audit fees.

2.4. The impact of SOX on audit pricing of REM

AEM was more pervasive compared to REM in the pre-SOX period because the cost of AEM was relatively low in this period. However, it has increased significantly after SOX went effective in 2002. Cohen et al. (2008) provide evidence suggesting that the heightened regulatory scrutiny and/or additional certification requirements associated with the enactment of SOX changed the relative costs of AEM and REM, making AEM relatively more costly to firms during the post-SOX

period. In response, firms have switched from AEM to REM to manage earnings in the post-SOX period (Cohen et al., 2008; Cohen and Zarowin, 2010). We posit that auditors focused on AEM in their financial statement audits in the pre-SOX period because most firms used AEM rather than REM, and because REM was more difficult for auditors to detect at that time. Thus, the impact of AEM on audit fees was larger than that of REM in this period. However, auditors pay more attention to REM in the post-SOX period because many firms have switched from AEM to REM, and because auditors become more knowledgeable about REM over time. As a result, they charge higher audit fees for REM than for AEM in the post-SOX period given that REM is more detrimental to long-term firm values than AEM. This leads to our first hypothesis in alternative form:

H1: The positive relation between REM and audit fees is stronger than the positive relation between AEM and audit fees in the post-SOX period, while the opposite is true in the pre-SOX period, all else being equal.

2.5. The impact of ICW on audit pricing of REM

Prior studies report that ICW deteriorates accruals quality (Ashbaugh-Skaife et al., 2008; Doyle et al., 2007b). ICW also increases the level of audit fees (Hogan and Wilkins, 2008; Hoitash et al., 2008; Raghunandan and Rama, 2006). Because auditors charge higher audit fees for firms with more extensive REM (Choi et al., 2016), it is an interesting extension to explore whether this audit-fee-increasing effect of REM is intensified by the existence of ICW. If we combine the aforementioned related studies, it is possible to draw a prediction that the positive relation between REM and audit fees will be more pronounced for ICW firms than for non-ICW firms. An efficient internal control system is designed to prevent managers from conducting an excessive level of AEM or REM and from reporting inflated earnings numbers in financial statements. Therefore, auditors take more time and a larger amount of resources to detect opportunistic REM (and AEM) in the reported earnings numbers if client firms do not have efficient internal control systems. Consequently, auditors may have an incentive to charge a higher level of audit fees per detected REM to be compensated for this additional effort (and risk). We formulate this prediction as the second hypothesis in alternative form:

H2: The positive relation between REM and audit fees is more pronounced for firms with ICW than for firms without ICW, all else being equal.

3. Measurement of main variables and empirical specification

3.1. Intensity of AEM

As in other studies, we use an abnormal portion of total accruals or, equivalently, discretionary accruals (*DAC*) as the proxy for the outcome of opportunistic AEM. To decompose total accruals into the expected, normal portion and the unexpected, abnormal portion, we employ the modified Jones (1991) model as proposed by Dechow et al. (1995):

$$TAC_{jt} / A_{jt-1} = \beta_1[1/A_{jt-1}] + \beta_2[\Delta Sales_{jt} / A_{jt-1}] + \beta_3[PPE_{jt} / A_{jt-1}] + \varepsilon_{jt}, \quad (1)$$

where for firm j and in year t (or t - 1), *TAC* denotes total accruals; A, ΔSales, and PPE represent total assets, the change in net sales dollars, and gross property, plant, and equipment, respectively; and ε is an error term. Total accruals (*TAC*) are computed as $TAC = EBXI - CFO$, where EBXI represents earnings before extraordinary items and discontinued operations and CFO_{jt} is cash flow from operations, which is taken directly from the statement of cash flows.

Eq. (1) is estimated cross-sectionally for each two-digit Standard Industrial Classification (SIC) code and in each year. Using the estimated parameters of Eq. (1), we compute nondiscretionary total accruals, denoted by NTAC, as

$$NTAC_{jt} = \hat{\beta}_1[1/A_{jt-1}] + \hat{\beta}_2[(\Delta Sales_{jt} - \Delta REC_{jt})/A_{jt-1}] + \hat{\beta}_3[PPE_{jt}/A_{jt-1}], \quad (2)$$

where $\triangle REC$ is the change in net receivables and the other variables are as defined earlier. We then obtain *DAC* by taking the difference between *TAC* (lagged asset-deflated) and *NTAC*, and take the absolute value of *DAC* to use for the main analyses. To alleviate concerns over the possibility that these residual-based measure is unduly influenced by a small number of outliers, and is measured with errors, we classify |*DAC*| into deciles in each sample year, and then standardise the decile rank (by dividing it by nine) such that its value ranges from zero to one, denoted by *SR*|*DAC*|, which is used as the main proxy for the intensity of AEM.

3.2. Intensity of REM

To measure the intensity of REM, we follow Roychowdhury (2006). We focus on three methods of manipulating real operational activities: (a) offering excessive sales discounts or lenient credit terms to temporarily boost sales revenues, (b) engaging in overproduction to report a lower cost of goods sold, and (c) reducing or deferring discretionary expenditures (Chan et al., 2015; Cohen et al., 2008; Cohen and Zarowin, 2010; Zang, 2012). We estimate the normal level of operating cash flows, production costs, and discretionary expenses using the equations as follows:

$$\frac{CFO_{jt}}{A_{j,t-1}} = a_1 \frac{1}{A_{j,t-1}} + a_2 \frac{Sales_{jt}}{A_{j,t-1}} + a_3 \frac{\Delta Sales_{jt}}{A_{j,t-1}} + \varepsilon_{jt}, \quad (3)$$

$$\frac{Prod_{jt}}{A_{j,t-1}} = a_1 \frac{1}{A_{j,t-1}} + a_2 \frac{Sales_{jt}}{A_{j,t-1}} + a_3 \frac{\Delta Sales_{jt}}{A_{j,t-1}} + a_4 \frac{\Delta Sales_{j,t-1}}{A_{j,t-1}} + \varepsilon_{jt}, \quad (4)$$

$$\frac{DiscE_{jt}}{A_{j,t-1}} = a_1 \frac{1}{A_{j,t-1}} + a_2 \frac{Sales_{j,t-1}}{A_{j,t-1}} + \varepsilon_{jt}, \quad (5)$$

where for firm *j*, CFO_t is cash flow from operating activities in year *t*; A_{t-1} is total assets at the end of year t-1; Salest is the amount of sales in year *t*; $\Delta Sales_t$ ($\Delta Sales_{t-1}$) is the change in sales amount from year *t*-1 (t-2) to *t* (*t*-1); $Prod_t$ is the sum of the cost of goods sold and the change in inventory in year *t*; and $DiscE_t$ is discretionary expenditures defined as the sum of selling, general and administrative (SG&A) expenses, research and development (R&D) expenses, and advertising expenses in year *t*.

Abnormal CFO, abnormal *Prod*, and abnormal *DiscE*, denoted by *AbCFO*, *AbProd*, and *AbDiscE*, respectively, are the differences between actual values of lagged asset-deflated CFO, *Prod*, and *DiscE* and their normal levels (i.e., the fitted values of Eqs. (3), (4), and (5), respectively). We use the unsigned values of these variables, that is, |*AbCFO*|, |*AbProd*|, and |*AbDiscE*|, for our analyses. Given a level of sales, firms that boost reported earnings via REM are likely to use one or all of three REM strategies, that is, upward sales manipulation, overproduction, and reduction of discretionary expenses (Cohen et al., 2008). To capture the effect of REM via all three strategies or various combinations of the three strategies on audit fees, we develop a single, comprehensive measure of REM, denoted by |*AbREM*|, by summing the three individual REM measures, i.e., |*AbCFO*|, |*AbProd*|, and |*AbDiscE*|. As done for AEM, we classify |*AbREM*| into deciles in each sample year and standardise the decile ranks such that the value ranges from zero to one. The resulting proxies for the intensity of aggregate REM are *SR*|*AbREM*|. Besides mitigating any outlier effect, this standardised rank serves better for the purpose of comparing the magnitude of its coefficient with that of the coefficient on the AEM proxy in relation to audit fees.

3.3. Empirical specification

To test Hypothesis 1, we divide the total sample into two based on the timing of SOX enactment (i.e., the post-SOX period is 2002 or later years) and regress the following model for each subsample:

$$\begin{aligned} LNAFEE_{jt} = {} & \alpha_0 + \alpha_1 SR|DAC|_{jt} + \alpha_2 SR|AbREM|_{jt} + \alpha_3 LNA_{jt} + \alpha_4 NBS_{jt} + \alpha_5 NGS_{jt} \\ & + \alpha_6 INVREC_{jt} + \alpha_7 ISSUE_{jt} + \alpha_8 FOREIGN_{jt} + \alpha_9 LOSS_{jt} + \alpha_{10} LEV_{jt} \\ & + \alpha_{11} ROA_{jt} + \alpha_{12} BM_{jt} + \alpha_{13} CGSALES_{jt} + \alpha_{14} BIG4_{jt} + \sum_i \alpha_i IND_i \\ & + \sum_t \alpha_t YEAR_t + \varepsilon_{jt}, \end{aligned} \tag{6}$$

where for firm *j* and year *t*, *LNAFEE* denotes the natural logarithm of audit fees paid to auditors for their financial statement audits, and *SR*|*DAC*| and *SR*|*AbREM*| are the test variables, which represent the standardised decile ranks of the AEM and REM measures, respectively. To test Hypothesis 2, we interact each of our test variables (i.e., *SR*|*DAC*| and *SR*|*AbREM*|) with the indicator for a firm-year with material internal control weaknesses (*MW*), and then regress the model using the total sample.[2] Hypothesis 1 is supported if $a_2 > a_1 > 0$ in the post-SOX period while $a_1 > a_2 > 0$ in the pre-SOX period. Hypothesis 2 is supported if the coefficient on *SR*|*AbREM*|**MW* is significantly positive. We conduct time-series cross-sectional pooled ordinary least squares regressions with standard errors corrected for firm-level clustering using Eq. (6) to test our hypotheses.

In order to isolate the incremental effect of earnings management on audit fees from the effects of other determinants, we add various control variables commonly adopted in prior studies. The natural logarithm of total assets (*LNA*) is included to control for the effect of client firms' size on audit fees. The number of business segments measured by 2-digit SIC (*NBS*) and the number of geographic segments (*NGS*), the ratio of accounts receivable plus inventory over total assets (*INVREC*), equity and debt issuance dummy (*ISSUE*), and foreign operation dummy (*FOREIGN*) are included to control for the effect of client firms' operation complexity on audit fees. Loss dummy (*LOSS*), leverage (*LEV*), return on assets (*ROA*), the book-to-market ratio (*BM*), and the change in sales (*CGSALES*) are included to control for the inherent audit risk and profitability. Big 4 auditor dummy (*BIG4*) is included to control for the auditor size and brand name effect. To control for the unknown industry or year effects, we include 48 industry (Fama and French, 1997) and nine year dummies. The Appendix provides the detailed definitions of all the variables used in the study.

2) The main results are qualitatively very similar when we use the raw values of |*DAC*| and |*AbREM*| instead of their ranked values. However, we use ranked values in the reported analyses because it is difficult to interpret the relative importance of AEM and REM on audit fees in the pre- and post-SOX periods using the coefficients on these raw values.

4. Empirical results

4.1. Samples, data sources, and descriptive statistics

We extract financial statement data from *Compustat*, and audit fee, auditor, and internal control deficiencies data from *Audit Analytics*, respectively. The initial list of the sample starts from the firms listed on NYSE, AMEX or NASDAQ for the period 2000-2008. To be included in the sample, a firm must have all financial statement data required for computing the research variables, including the AEM and REM proxies, and the audit fee and auditor-related variables for each sample year. We exclude firms in the financial service industry (SIC code 6000 to 6999) to maintain homogeneous interpretations of various accounting variables across the sample firms in different industries. We also delete the observations with negative book values of equity. To alleviate concerns over potential problems arising from the existence of extreme observations, we delete observations that fall within the top and bottom 1% of the annual empirical distributions of the major research variables included in Eq. (6). After applying the above selection criteria and data requirements, we obtain two sets of final samples. The first one is used to test H1, which consists of 14,678 firm-years for 3,184 firms. The second one is used to test H2, which consists of 5,895 firm-years for 2,155 firms. The size of this second sample is smaller than that of the first one due to the shorter sample years of 2004-2008 and the additional data requirement for the existence of material internal control weaknesses (*MW*). As in Cohen et al. (2008), these final samples consist of larger and more profitable firms than the *Compustat* population due to the data requirements.

Table 1 provides descriptive statistics for the first sample used to test H1. The mean and median of *LNAFEE* are 6.60 and 6.61, respectively, with a standard deviation of 1.13, suggesting that *LNAFEE* is reasonably distributed. Total accruals are negative for the sample firms and are about 7% of lagged total assets. Consistent with evidence reported in many other studies, the mean and median values of signed abnormal accruals, that is, *DAC*, are close to 0, though both are negative, while the mean and median values of absolute (unsigned) abnormal accruals (i.e., $|DAC|$) are about 7.4% and 4.2%, respectively, of lagged total assets. The mean $|DAC|$ of 7.4% for our sample is very similar with that for the winsorised sample of Cohen et al. (2008). The mean and median values of absolute (unsigned) aggregate REM (i.e., $|AbREM|$) are 43.6% and 33.5%, respectively, of lagged total assets. Its standard deviation is fairly large, indicating that REM practices vary widely across firms. The signs and magnitudes of the signed REM proxies (not reported here) are similar to those reported in Cohen et al. (2008).

With respect to control variables, the descriptive statistics on total assets (*LNA*), number of business segments (*NBS*), number of geographic segments (*NGS*), inventory and receivables (*INVREC*), equity and debt issuance dummy (*ISSUE*), foreign operation dummy (*FOREIGN*), loss

dummy (*LOSS*), leverage (*LEV*), ROA, the book-to-market ratio (*BM*), sales change (*CGSALES*), and Big 4 auditor dummy (*BIG4*) are, overall, comparable to those reported in prior literature.

Table 4.1 Descriptive statistics

	n	mean	Std.	25%	median	75%
TAC/A	14,678	-0.0727	0.0984	-0.1071	-0.0602	-0.0239
DAC	14,678	-0.0034	0.1409	-0.0459	-0.0044	0.0380
|*DAC*|	14,678	0.0740	0.1199	0.0186	0.0423	0.0864
|*AbREM*|	14,678	0.4357	0.3643	0.1911	0.3354	0.5645
AFEE	14,678	1,381.03	1,895.28	326.09	741.50	1,600.00
LNAFEE	14,678	6.6048	1.1274	5.7902	6.6100	7.3784
LNA	14,678	13.2474	1.5515	12.1066	13.1967	14.3334
NBS	14,678	2.1080	1.6535	1.0000	1.0000	3.0000
NGS	14,678	2.5164	2.2231	1.0000	2.0000	4.0000
INVREC	14,678	0.2579	0.1703	0.1231	0.2368	0.3602
ISSUE	14,678	0.7527	0.4315	1	1	1
FOREIGN	14,678	0.0046	0.0091	0	0.0008	0.0059
LOSS	14,678	0.2912	0.4543	0	0	1
LEV	14,678	0.4483	0.2117	0.2771	0.4464	0.6040
ROA	14,678	0.0047	0.1638	-0.0121	0.0421	0.0846
BM	14,678	0.5921	0.5346	0.2814	0.4574	0.7120
CGSALES	14,678	0.1019	0.2627	0.0000	0.0675	0.1791
BIG4	14,678	0.9001	0.2998	1	1	1
EMPLOY	14,678	69.5744	72.1120	24.1557	48.2649	86.8907
EXORD	14,678	0.2167	0.4120	0	0	0
LIQUID	14,678	2.9760	2.9877	1.4558	2.1482	3.3703
CHANGE	14,678	0.0697	0.2546	0	0	0

This table presents descriptive statistics for the major variables used in the main analyses. AFEE is in thousands. All the variables are as defined in the Appendix.

Table 2 presents the correlation matrix of the major variables used in the analyses. All the correlation coefficients significant at less than the 1% level are boldfaced, the ones significant at less than the 5% level are italicised, and the others are insignificant at the 10% level. Interestingly, *LNAFEE* has negative correlations with both the AEM and REM proxies.[3] This is because the

3) This is consistent with Gul et al. (2003). They report a significantly positive coefficient on their measure of unsigned discretionary accruals in multivariate regressions. However, the univariate correlation between their unsigned discretionary accruals and the natural logarithm of audit fees is -0.223 and significant at the 1% level in their Table 3.

effects of other fee determinants are not yet isolated. Consistent with prior studies, *LNAFEE* is positively correlated with *LNA*, *NBS*, *INVREC*, *FOREIGN*, *LEV*, and *BIG4*. The proxy for the intensity of AEM (i.e., SR|DAC|) is significantly and positively correlated with the proxy for the intensity of REM (i.e., *SR|AbREM|*).

Table 4.2 Correlation matrix

	LNAFEE	SR|DAC|	SR|AbREM|	LNA	NBS	INVREC	FOREIGN	LOSS	LEV	ROA	BIG4
LNAFEE	1	-0.0871	-0.1494	0.7205	0.2294	0.0035	0.2805	-0.1733	0.3343	0.1854	0.1517
SR|DAC|	-0.0864	1	0.2000	-0.1934	-0.5365	0.0346	-0.0024	0.2161	-0.0694	-0.2082	-0.0513
SR|AbREM|	-0.1484	0.2000	1	-0.2756	-0.1058	0.0754	-0.0103	0.0937	-0.1607	-0.1215	-0.0586
LNA	0.7002	-0.1895	-0.2751	1	0.2256	-0.1011	0.1868	-0.3024	0.4136	0.3356	0.2704
NBS	0.1718	-0.0375	-0.0950	0.1736	1	0.0928	0.0134	-0.0886	0.1447	0.1022	0.0459
INVREC	0.0354	0.0253	0.0613	-0.0741	0.1356	1	0.1060	-0.1388	0.0921	0.1782	-0.0808
FOREIGN	0.4520	-0.0129	-0.0572	0.3223	0.0693	0.2128	1	-0.1368	0.0477	0.1627	0.0417
LOSS	-0.1741	0.2161	0.0937	-0.3045	-0.0743	-0.1559	-0.1628	1	0.0049	-0.6775	-0.0426
LEV	0.3316	-0.0750	-0.1688	0.4368	0.1205	0.0877	0.0739	-0.0090	1	-0.0092	0.1015
ROA	0.1319	-0.1534	0.0067	0.2499	0.0367	0.1715	0.1899	-0.7701	-0.1167	1	0.0124
BIG5	0.1534	-0.0513	-0.0586	0.2793	0.0341	-0.0740	0.0772	-0.0426	0.1050	0.0214	1

This table presents the correlation matrix between the major variables used in the main analyses. The values to above the diagonal are Pearson correlation coefficients, and those below the diagonal are Spearman correlation coefficients. All the correlations that are significant at less than the 1% (5%) level are boldfaced (italicized). Correlations that are neither boldfaced nor italicized are insignificant at any conventional level. All the variables are as defined in the Appendix.

4.2. Audit pricing of REM

Before testing our main hypotheses, we replicate Choi et al. (2016) using our sample and empirical specifications. Column (1) of Table 3 reports the results of regressing Eq. (6) using our first sample (that is, the sample used to test H1 below). The coefficient on *SR|AbREM|* is 0.1074 and significant at the 1% level (t-value = 3.78) even after controlling for the effect of AEM and other audit fee determinants. This means that auditors charge higher audit fees to their client firms with more extensive REM, and this pricing of REM is incremental to the pricing of AEM and other factors, consistent with Choi et al. (2016). Turning to control variables, audit fees increase with firm size (*LNA*), operation complexity proxied by the number of business and geographic segments (*NBS*, *NGS*), the ratio of inventory plus receivables over assets (*INVREC*), equity and debt issuance (*ISSUE*), and the existence of foreign operations (*FOREIGN*), and with the level of inherent risk proxied by loss reporting (*LOSS*) and leverage (*LEV*). Audit fees decrease with profitability and stability proxied by ROA and the book-to-market ratio (*BM*). Consistent with prior studies, Big 4 auditors (*BIG4*) charge higher audit fees. The coefficient on sales growth (*CGSALES*) is insignificant. The adjusted R2 is 58.4%, indicating that Eq. (6) is well specified.

To investigate any possibility that these base results can be the artifact of correlated-omitted variables, we include more comprehensive control variables in Eq. (6) and repeat the regression. We add the number of employees (*EMPLOY*), the indicator for extraordinary gains or losses (*EXORD*), the current ratio (*LIQUID*), and the indicator for auditor change (*CHANGE*). The results are shown in Column (2) of Table 3. The coefficient on *EXORD* is positive (0.1088) and that on *LIQUID* is negative (-0.0298), both significant at the 1% level. This indicates that audit fees increase in firms' risk and decrease in their liquidity. The coefficient on *CHANGE* is negative and significant at the 1% level (coeff. = -0.1102, t-value = -4.33). This is consistent with prior literature that auditors discount audit fees for their new clients, i.e., low-balling (DeAngelo, 1981; Francis and Simon, 1987; Huang et al. 2009; Simon and Francis, 1988; Turpen, 1990). The coefficient on *EMPLOY* is insignificant. More importantly, the coefficient on the variable of our main interest, i.e., *SR*|*AbREM*| maintains its sign and statistical significance (coeff. = 0.1080, t-value = 3.82) even after controlling for more comprehensive audit fee determinants. This reassures that our base results do not capture unidentified effects of the omitted audit fee determinants.

Table 4.3 The effect of REM on audit fees

Variable	(1)	(2)
Intercept	-0.7525***	-0.4152***
	(-6.98)	(-3.27)
SR|*DAC*|	0.0659***	0.0588***
	(2.97)	(2.66)
SR|*AbREM*|	0.1074***	0.1080***
	(3.78)	(3.82)
LNA	0.5063***	0.4950***
	(60.10)	(49.44)
NBS	0.0403***	0.0360***
	(6.60)	(5.93)
NGS	0.0654***	0.0665***
	(11.54)	(11.80)
INVREC	0.4726***	0.4276***
	(7.23)	(6.54)
ISSUE	0.1908***	0.1918***
	(9.50)	(9.64)
FOREIGN	13.1562***	12.6549***
	(5.01)	(4.85)
LOSS	0.0550**	0.0704***
	(2.40)	(3.10)
LEV	0.1140**	-0.1086**
	(2.29)	(-2.01)
ROA	-0.5242***	-0.5410***
	(-7.86)	(-8.02)

Variable	(1)	(2)
BM	-0.1269***	-0.1365***
	(-8.34)	(-8.93)
CGSALES	-0.0070	-0.0057
	(-0.26)	(-0.21)
BIG4	0.0887**	0.0076
	(2.06)	(0.43)
EMPLOY		0.0001
		(0.68)
EXORD		0.1088***
		(5.55)
LIQUID		-0.0298***
		(-8.13)
CHANGE		-0.1102***
		(-4.33)
Adj. R^2	0.5840	0.5909
No. of obs.	14,678	14,678

This table presents the results replicating Choi et al. (2016) on the audit pricing of REM in Column (1), and the sensitivity test results after controlling for additional factors in Column (2). All the variables are as defined in the Appendix. The results are based on the pooled ordinary least squares regressions with standard errors corrected for firm-level clustering. The numbers in parentheses are t-values, and ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively (two tailed).

4.3. Temporal variation in audit pricing of REM before and after SOX

To test H1, we regress Eq. (6) for the pre-SOX (i.e., 2000-2001) and post-SOX (i.e., 2002-2008) periods separately and report the results in Columns (1) and (2) of Table 4, respectively. Column (1) shows that the coefficients on both *SR*|*DAC*| and *SR*|*AbREM*| are positive and significant. The coefficient on *SR*|*DAC*| (0.1020) is larger than that on *SR*|*AbREM*| (0.0703) even though this difference is not statistically significant, and the former is statistically more significant than the latter (1% versus 5%). This result weakly supports H1 that audit fees increase with the intensity of AEM to a greater extent than with REM in the pre-SOX period.

Column (2) shows that the coefficients on both *SR*|*DAC*| and SR|AbREM| are positive and significant. The coefficient on *SR*|*AbREM*| (0.1096) is larger than that on *SR*|*DAC*| (0.0455), and the former is statistically more significant than the latter (1% versus 5%). Moreover, the Wald test shows that the difference in coefficient magnitude is statistically significant at less than the 5% level. This result is consistent with H1 that audit fees increase with the intensity of REM to a greater extent than with that of AEM in the post-SOX period. The overall implications from the control variables are similar with those in Column (1) of Table 3 using the total sample.

In sum, auditors charge higher audit fees on firms engaging in more extensive earnings management both through accrual and real operation manipulations both in the pre- and post-SOX periods but they focus more on AEM in the pre-SOX period because few firms conduct

REM which is also difficult for auditors to detect. On the contrary, auditors put more weight on REM for their audit fee determinations in the post-SOX period because more firms engage in REM due to the increased costs of AEM and accordingly the auditors become more knowledgeable about REM over time.

Table 4.4 Temporal variation in audit pricing of REM before and after SOX

Variable	(1) Before SOX	(2) After SOX
Intercept	-1.3852***	-0.3398***
	(-11.24)	(-3.07)
SR|DAC|	0.1020***	0.0455**
	(3.09)	(2.06)
SR|AbREM|	0.0703**	0.1096***
	(2.10)	(3.80)
LNA	0.4876***	0.4961***
	(51.30)	(56.80)
NBS	0.0411***	0.0406***
	(5.60)	(6.67)
NGS	0.0604***	0.0593***
	(8.07)	(10.30)
INVREC	0.7836***	0.4953***
	(11.12)	(7.33)
ISSUE	0.0105	0.0323
	(0.49)	(1.52)
FOREIGN	13.9239***	12.6407***
	(6.41)	(4.15)
LOSS	0.0484*	0.0690***
	(1.77)	(2.96)
LEV	0.4196***	0.1714***
	(7.08)	(3.38)
ROA	-0.5511***	-0.6253***
	(-7.68)	(-9.11)
BM	-0.0381**	-0.1114***
	(-2.35)	(-6.41)
CGSALES	-0.1806***	0.0387
	(-6.21)	(1.25)
BIG4	0.0824**	0.0835**
	(2.12)	(2.04)
Adj. R^2	0.7487	0.6129
No. of obs.	2,866	11,812
Wald test: SR|DAC| = SR|AbREM| before SOX; F = 0.46 with p < 0.4990		
Wald test: SR|DAC| = SR|AbREM| after SOX; F = 4.41 with p < 0.0359		

This table presents the temporal variation in audit pricing of REM before and after SOX. Both AEM and REM increases audit fees in both periods but the impact of REM is larger (smaller) than that of AEM after (before) SOX. The Wald tests indicate that the differential impact of AEM and REM is statistically insignificant at conventional levels before SOX, and that it is statistically significant at the 5% level after SOX. All the variables are as defined in the Appendix. The results are based on the pooled ordinary least squares regressions with standard errors corrected for firm-level clustering. The numbers in parentheses are t-values, and ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively (two tailed).

4.4 Cross-sectional variation in audit pricing of REM depending on ICW

To test H2, we add the indicator for the existence of material internal control weaknesses (i.e., *MW*) and its interactions with *SR|DAC|* and *SR|AbREM|* in Eq. (6), and then regress this model using our second sample. The results are reported in Column (1) of Table 5. Consistent with prior studies, the coefficient on *MW* is positive and significant (coeff. = 0.2325, t-value = 4.10), indicating that auditors charge higher audit fees to firms reporting internal control deficiencies in order to be compensated for the increased audit effort and risk.

The coefficient on *SR|AbREM|* is also positive and significant at the 5% level (coeff. = 0.0730, t-value = 2.37), consistent with the results in Tables 3 and 4. More importantly, the coefficient on *SR|AbREM|*MW* are positive and significant at the 1% level (coeff. = 0.1985, t-value = 2.62). This means that auditors charge higher audit fees to firms engaging in more extensive REM, and this penalty becomes more severe for firms reporting material internal control weaknesses, supporting H2. REM's audit fee increasing effect is almost four times larger for ICW firms than for non-ICW firms.[4)]

Interestingly, this effect does not exist in terms of AEM, seen from the insignificant coefficient on *SR|DAC|*MW*. The coefficient on *SR|DAC|* is insignificant as well. These results imply that, after controlling for the main effect of ICW, auditors do not charge higher audit fees to firms conducting more AEM, possibly because the additional compensation for ICW subsumes the penalty for AEM.

Table 5.5 Cross-sectional variation in audit pricing of REM depending on ICW

Variable	(1)	(2)
Intercept	0.4379***	0.4594***
	(3.50)	(3.68)
MW	0.2325***	
	(4.10)	
SR|DAC|	-0.0020	0.1863***
	(-0.08)	(2.91)
*SR|DAC|*MW*	0.0422	0.0326
	(0.56)	(0.43)
SR|AbREM|	0.0730**	
	(2.37)	
*SR|AbREM|*MW*	0.1985***	
	(2.62)	

4) The sum of the coefficients on *SR|AbREM|* and *SR|AbREM|*MW* is 0.0730 + 0.1985 = 0.2715, which is the total audit pricing effect of ICW firms. This is 3.72 times of 0.0730, which is the audit pricing effect of non-ICW firms.

Variable	(1)	(2)
SR|AbCFO|		-0.1566***
		(-5.27)
SR|AbProd|		-0.0107
		(-0.31)
SR|AbDiscE|		0.2086***
		(6.58)
*SR|AbCFO|*MW*		0.1218
		(1.56)
*SR|AbProd|*MW*		0.1143
		(1.27)
*SR|AbDiscE|*MW*		0.0525
		(0.57)
LNA	0.4623***	0.4631***
	(45.78)	(46.36)
NBS	0.0421***	0.0405***
	(6.48)	(6.36)
NGS	0.0555***	0.0536***
	(8.88)	(8.68)
INVREC	0.5666***	0.5261***
	(7.43)	(7.02)
ISSUE	0.0191	0.0214
	(0.85)	(0.96)
FOREIGN	11.1189***	11.4518***
	(3.80)	(3.97)
LOSS	0.0970***	0.0952***
	(3.46)	(3.44)
LEV	0.0888	0.0772
	(1.52)	(1.34)
ROA	-0.5139***	-0.5346***
	(-5.83)	(-6.22)
BM	-0.0926***	-0.1069***
	(-2.80)	(-3.21)
CGSALES	-0.1229***	-0.1071***
	(-4.18)	(-3.54)
BIG4	0.0876**	0.0821**
	(2.03)	(2.07)
Adj. R^2	0.6808	0.6869
No. of obs.	5,895	5,895

This table presents the cross-sectional variation in audit pricing of REM depending on the existence of material internal control weaknesses using the aggregate REM measure in Column (1), and using the individual REM measures in Column (2). REM increases audit fees to a greater extent for firms with material internal control weaknesses. All the variables are as defined in the Appendix. The results are based on the pooled ordinary least squares regressions with standard errors corrected for firm-level clustering. The numbers in parentheses are t-values, and ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively (two tailed).

5. Sensitivity tests

5.1. Using individual REM measures

Thus far, we used the aggregate REM measure to proxy for the firms' earnings management through real operation manipulations. This is because three individual REM measures serve the common construct of real earnings management and the aggregate measure can reduce measurement errors in the individual proxies. However, each individual REM measure also has a unique aspect of real operation manipulations. If auditors understand this, they might factor each real earnings management activity into the determination of audit fees differentially. We explore this possibility by replacing *SR*|*AbREM*| with *SR*|*AbCFO*|, *SR*|*AbProd*| and *SR*|*AbDiscE*|, which are the standardised decile ranks of |*AbCFO*|, |*AbProd*|, and |*AbDiscE*|, respectively, in regressing Eq. (6). The untabulated results to repeat the test in Column (1) of Table 3 are consistent with Choi et al. (2016). Among the three individual REM measures, the coefficient on *SR*|*AbDiscE*| is positive and significant at the 1% level (coeff. = 0.2201, t-value = 7.95), which is double the magnitude of the coefficient on the aggregate REM measure in Column (1) of Table 3 (0.1074). The coefficients on *SR*|*AbCFO*| and *SR*|*AbProd*| are negatively significant and insignificant, respectively. Thus, the main result on *SR*|*AbREM*| in Table 3 is driven mostly by *SR*|*AbDiscE*|. This indicates that auditors view firms' real earnings management through reducing or postponing R&D, advertising, or SG&A investments more detrimental to the long-term firm values than through sales price discounts, lenient credit terms or excessive productions, and accordingly, charge higher audit fees for this activity than for other real earnings management activities to protect themselves from the potential litigation risk.

As in Column (1) of Table 5, we interact the indicator for the existence of material internal control weaknesses (*MW*) with each of *SR*|*AbCFO*|, *SR*|*AbProd*|, and *SR*|*AbDiscE*| to test H2 using the individual REM measures.[5] The results are reported in Column (2) of Table 5. The coefficients on *SR*|*DAC*| and *SR*|*AbDiscE*| are still significantly positive indicating that auditors charge higher audit fees to firms with more extensive AEM and REM when those firms do not report material internal control weaknesses. In contrast, the coefficient on *SR*|*AbDiscE*|**MW* is positive but insignificant. The coefficients on *SR*|*AbCFO*|**MW* and *SR*|*AbProd*|**MW* are also insignificantly positive. These results imply that audit pricing of each individual REM activity is indifferent between ICW and non-ICW firms. Therefore, we can see that the significantly positive coefficient on *SR*|*AbREM*|**MW* in Column (1) of Table 5 is not driven by a specific type of individual REM activity but by the combined overall REM activities using all of the three methods.

5) It is not feasible to test H1 using the individual REM measures because the essence of H1 is comparing the audit pricing effect of overall REM with that of AEM in the pre- and post-SOX periods.

5.2. Other sensitivity tests

We conduct a battery of additional analyses, the results of which are not tabulated for brevity, to check the robustness of the main results. We repeat the main analyses, using the performance-adjusted measure of AEM as proposed by Kothari et al. (2005). We also repeat the main analyses using the signed AEM (i.e., *SRDAC*) and REM measures (i.e., *SRAbCFO*, *SRAbProd*, *SRAbDiscE*, and *SRAbREM*). The main inferences are unaltered by the use of these alternative earnings management variables. We measure the AEM variable using current accruals instead of total accruals and repeat the main analyses. The results are robust to the use of this alternative accrual measure. We estimate the main regression in Eq. (6), using raw values of AEM and REM in lieu of their standardised ranked values, and find that their coefficients are positive and significant at the 1% level both in the pre- and post-SOX periods, and that the coefficient on the interaction term between raw REM variable and *MW* is significantly positive. Even if we set the earnings management measures to be the explanatory variables for the audit fees, the causality is not unambiguous. To mitigate this concern, we replace the AEM and REM proxies in Eq. (6) with their one-year lagged values and repeat the main analyses. All the implications are maintained. We also estimate the main regression in Eq. (6) using Fama-MacBeth (1973) annual cross-sectional regressions. The average of nine yearly coefficients is computed and t-values are computed using standard errors obtained from the empirical distribution of each coefficient over the nine-year period after correcting for serial correlation. The statistical inferences on the test variables are qualitatively similar to those reported in the main analyses.

6. Conclusion

With time-series cross-sectional pooled ordinary least squares regressions of audit fees on the proxies for AEM and REM, and other control variables for audit fee determinations, we find that the positive relation between REM and audit fees is stronger than the same relation between AEM and audit fees in the post-SOX period, while the opposite is true in the pre-SOX period. We also find that the positive relation between REM and audit fees is more pronounced for firms with internal control problems.

The results provide important implications for managers, auditors, regulators, and researchers. First, recent survey evidence shows that managers are willing to use REM to manipulate reported earnings even though REM activities have adverse consequences on long-term firm value. The evidence indicates that the use of REM could be costly to a firm, especially in the post-SOX period and for firms with internal control deficiencies, because their auditors see through its cash flow and shareholder litigation consequences and are able to factor this into the increased audit fees. Second,

this study suggests that regulators who are concerned with the quality of reported earnings should understand that, when firms use REM and AEM in a substitutive way depending on their relative costs, auditors are able to factor this opportunistic behavior into their audit fee determinations. Thus, when setting financial reporting and auditing policies, regulators need to consider managers' incentives for the alternative earnings management choices and auditors' reactions to this opportunism. Finally, the results suggest that academic researchers interested in the mechanism of audit fee determinations should not consider only AEM but also REM as an important factor affecting audit risks, especially in the post-SOX period and for firms with internal control problems.

As in other REM studies, the results reported in this paper are subject to measurement errors inherent in the estimation of REM (as well as AEM), and should thus be interpreted cautiously. The residual-based measures of abnormal CFO, abnormal production costs, and abnormal discretionary expenditures may suffer from non-trivial measurement errors, in the sense that these measures of abnormal operating activities may simply reflect the outcome of optimal business decisions in certain firms or operating environments rather than the outcome of opportunistic REM with an aim to manipulate reported earnings. One way to alleviate this concern is to develop more refined models that provide a finer decomposition of the outcomes associated with normal, optimal business decisions and abnormal, opportunistic decisions. Given the scope of the study, we leave the above issue to future research.

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Appendix Variable definitions

A = total assets (annual Compustat data item AT);

Sales = annual Compustat data item SALE;

REC = accounts receivable (annual Compustat data item RECT);

PPE = gross property, plant, and equipment (annual Compustat data item PPEGT);

TAC/A = total accruals divided by lagged total assets, where total accruals (TAC) are computed by income before extraordinary items (annual Compustat data item IBC) minus CFO;

DAC = discretionary accruals, estimated by the modified Jones model;

NTAC = non-discretionary accruals, estimated by the modified Jones model;

AbCFO = level of abnormal CFO, where CFO is computed by annual Compustat data item OANCF minus item XIDOC;

AbProd = level of abnormal production costs, where production costs are defined as the sum of the cost of goods sold (annual Compustat data item COGS) and the change in inventories (item INVT);

AbDiscE = the level of abnormal discretionary expenses, where discretionary expenses are defined as the sum of advertising expenses (annual Compustat data item XAD), R&D expenses (item XRD), and SG&A expenses (item XSGA);

SRDAC = standardised decile rank of *DAC,* which is computed by ranking *DAC* into deciles each year and standardising them to the range of 0 to 1;

SR|DAC| = standardised decile rank of |*DAC*|, which is computed by ranking |*DAC*| into deciles each year and standardising them to the range of 0 to 1;

SRAbCFO = standardised decile rank of *AbCFO,* which is computed by ranking (-1)**AbCFO* into deciles each year and standardising them to the range of 0 to 1;

SRAbProd = standardised decile rank of *AbProd,* which is computed by ranking *AbProd* into deciles 0 to 9 each year and standardising them to the range of 0 to 1;

SRAbDiscE = standardised decile rank of *AbDiscE,* which is computed by ranking (-1)**AbDiscE* into deciles 0 to 9 each year and standardising them to the range of 0 to 1;

SRAbREM = standardised decile rank of REM, which is computed by summing (-1)**AbCFO*, *AbProd*, and (-1)**AbDiscE* and ranking this sum into deciles 0 to 9 each year and standardising them to the range of 0 to 1;

SR|AbCFO| = standardised decile rank of |*AbCFO*|, which is computed by ranking |*AbCFO*| into deciles 0 to 9 each year and standardising them to the range of 0 to 1;

SR|AbProd| = standardised decile rank of |*AbProd*|, which is computed by ranking |*AbProd*| into deciles 0 to 9 each year and standardising them to the range of 0 to 1;

SR|AbDiscE| = standardised decile rank of |*AbDiscE*|, which is computed by ranking |*AbDiscE*| into deciles 0 to 9 each year and standardising them to the range of 0 to 1;

SR|AbREM| = standardised decile rank of REM, which is computed by summing |*AbCFO*|, |*AbProd*|, and |*AbDiscE*| and ranking this sum into deciles 0 to 9 each year and standardising them to the range of 0 to 1;

MW = 1 if a firm reports one or more material internal control weaknesses in year t.

LNAFEE = natural logarithm of audit fees paid (thousands);

LNA = natural logarithm of total assets (thousands);

NBS	=	natural logarithm of one plus number of business segments;
NGS	=	natural logarithm of one plus number of geographic segments;
INVREC	=	inventory and receivables divided by total assets;
ISSUE	=	1 if the sum of debt and equity issues during the past 3 years are more than 5% of total assets, and 0 otherwise;
FOREIGN	=	1 if a firm pays any foreign income tax, and 0 otherwise;
LOSS	=	1 if a firm reports a loss during the fiscal year, and 0 otherwise;
LEV	=	leverage, computed by total liabilities (annual Compustat data item LT) divided by total assets;
ROA	=	income before extraordinary items (annual Compustat data item IBC) divided by average total assets;
BM	=	book-to-market ratio of common equity, computed by the book value of equity (annual Compustat data item CEQ) divided by the market value of equity (CRSP per share stock price x annual Compustat item CSHO) at fiscal year-end t, winsorized at 0 and 4;
CGSALES	=	sales change from prior fiscal year divided by the beginning total assets of fiscal year t;
BIG4	=	1 if a firm's auditor is one of the big 4 audit firms;
EMPLOY	=	square root of the number of employees;
EXORD	=	1 if a firm reports any extraordinary gains or losses, and 0 otherwise;
LIQUID	=	current assets (Compustat item ACT) divided by current liabilities (LCT); and
CHANGE	=	1 if a firm's auditor has been changed in fiscal year t.