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The COVID-19 and earnings management: China's evidence

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This study investigated the relationship between the COVID-19 outbreak and the Chinese listed firms' earnings management practices. It also examined how this relationship was moderated by the Chinese listed firms' corporate social responsibility (CSR) and the external corporate governance mechanism. The data in this study were mainly retrieved from the China Stock Market and Accounting Research (CSMAR) database and the Chinese Research Data Services Platform (CNRDS). The final sample contained 2,029 A-share firms listed in the Shanghai and Shenzhen Stock Exchanges, which released financial reports during the pandemic in 2020. The study applied the performance-adjusted Jones and the modified Jones model to calculate accrual-based earnings. To estimate the real activity-based earnings, this study used the following three measurements: The absolute value of the abnormal cash flow from operations, the absolute value of the abnormal production costs, and the absolute value of the abnormal discretionary expenditures. The results of this study indicated an increase in accrual-based earnings management (AEM) and a significant decline in real activity-based earnings management (REM), in firms in the most severely affected regions. In these regions, both AEM and REM were less pronounced for the firms with a higher CSR performance than those with a lower CSR performance. Moreover, firms audited by the Big 10 auditors were less likely to manipulate earnings through AEM or REM.

Key words: COVID-19, earnings management, corporate social responsibility (CSR), big 10 auditors.

INTRODUCTION

The COVID-19 outbreak has exerted varied impacts on the financial market and firm financial performance (Ruiz et al., 2020). Given the scenario and firm behavior during financial crises, the firms are expected to manipulate their reported earnings to respond to the current negative market environment (Choi et al., 2011). The manipulation of earning or earnings management is divided into two streams-accrual-based earnings management (AEM) and real activity-based earnings management (REM) (Graham et al., 2005; Kim et al., 2018). AEM occurs when managers manipulate the accrual component of earnings, while REM occurs when managers manipulate real activities, such as when they reduce expenditures on research and development, which directly impacts the cash flow of the firms (Cimini, 2015).

The research on earnings management has focused on

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AEM and REM, given that earnings are the sum of accruals and operating cash flows. The empirical research has shown substantial evidence that firms manage earnings by manipulating various operational, investment, financial activities (Xu et al., 2007) and discretionary expenditures (Roychowdhury, 2006). For instance, Baber and Fairfield (1991) and Roychowdhury (2006) have investigated the manipulation of operational and investment activities, particularly the manipulation of discretionary expenditures. Studies have also examined firms' manipulation of production, inventory, and sales to smooth earnings and meet earnings targets (Dhaliwal et al., 1994; Roychowdhury, 2006). In this regard, studies have found that firms can use the income from the sales of long-term assets to smooth earnings and achieve earnings forecasts (Bartov, 1993; Herrmann et al., 2003). Earnings management also occurs when managers use judgments in financial reporting (Healy and Wahlen, 1999). Dye (2002) defines such structuring of transactions as "classification manipulation." Mittelstaedt et al. (1995), Comiskey and Mulford (1986), Imhoff and Thomas (1988), and Ayers et al. (2002) are some studies that have examined earnings management by structuring operational and investment transactions.

Earnings manipulation through financial activities has been examined in regard to stock repurchases (Bens et al., 2003; Hribar et al., 2006), the relationship between earnings management and the use of stock options in the compensation package (Matsunaga, 1995; Kimbrough and Louis, 2004; Carter et al., 2006), and financial instruments (Hand et al., 1990; Barton, 2001; Pincus and Rajgopal, 2002), among others. Additionally, Marquardt and Wiedman (2005) have provided evidence on how firms engage in earnings management by structuring financial transactions.

The study contributes to the literature in the following perspectives. First, despite the growing literature on market and firm reactions to the COVID-19 (Ding et al., 2020; Ruiz et al., 2020), this is among the first studies to examine Chinese listed firms' earnings management practices in the context of the ongoing pandemic. Second, the empirical evidence provides inconclusive and contradictory views on the relationship between CSR and earnings management (EM) (Prior et al., 2008). There is insufficient and limited research on the CSR-EM relationship in China (Islam et al., 2015; Kim et al., 2018). The current study extends prior research by re-examining the CSR-EM relationship in China, during the pandemic crisis. Third, it adds insights to the literature by examining how the relationship between the COVID-19 and the Chinese listed firms' earnings management practices is moderated by the CSR and the external corporate governance mechanism (auditing by the Big 10 audit firms) (DeFond and Subramanyam, 1998). Finally, this study helps Chinese authorities and listed firms better understand the earnings management and CSR practices influencing the quality of financial reporting in the current scenario.

LITERATURE REVIEW AND RESEARCH HYPOTHESES

Several studies have examined the managerial manipulation of earnings (Healy, 1985; DeFond and Jiambalvo, 1994; Subramanyam, 1996; Fields et al., 2001). For instance, Bartov et al. (2001) examined the relationship between discretionary accruals and audit qualifications and found a positive relationship between audit qualifications and abnormal accruals. In the context of financially distressed firms, Dimitropoulos and Asteriou (2010) investigated the influence of corporate governance mechanisms on managers' behaviour and the accounting policies.

In the case of China, Chen et al. (2010) discovered that financially distressed companies adopt earnings management techniques to avoid the monitoring by the government. In the context of the European Union (EU), Dimitras et al. (2015)'s study on the relationship between the financial crisis and earnings management indicated that financially distressed companies audited by a Big 4 auditor exhibit lower discretionary accruals. Similarly, Cimini (2015) concluded that, during a financial crisis, an increase in conditional conservatism enhances the earnings quality and impairs earnings management. During such crises, the stringent monitoring of auditors contributed toward reducing earnings management, and thereby improved the quality of financial reporting.

According to Kim et al. (2018), managers can manipulate reported earnings through AEM and REM. While AEM occurs before the announcement of financial statements to inflate (or deflate) reported earnings, REM occurs throughout the financial year because it requires changes to the firm's operations (Zang, 2012). Hence, REM is costlier than that of AEM. However, AEM is subject to greater scrutiny from external auditors or regulators, and hence AEM is more easily detectable than REM (Kim et al., 2018). The adoption of AEM and REM is also determined by the current pandemic scenario. The COVID-19 has significantly affected Chinese listed firms' economic activities. Given that REM focuses on manipulating cash flows through operational, investment, and financial activities throughout the financial year, REM is more difficult to conduct than that of AEM in the most severely affected regions. Hence, the first hypothesis is as follows:

H1: During the COVID-19 outbreak, the listed firms in the most severely affected regions are more likely to engage in manipulating accrual-based earnings than real activity-based earnings.

Concerning CSR and EM, there is inconclusive and mixed empirical evidence on the relationship between

CSR and earnings management. While Scholtens and Kang (2013), Kim et al. (2012), Bozzolan et al. (2015), and Martinez-Ferrero et al. (2015) found a negative relationship between CSR and EM practices, Prior et al. (2008) documented a positive relationship, indicating management opportunistic behaviour. However, other studies have shown mixed results, indicating that the CSR-EM relationship can be moderated by various institutional factors (Chih et al., 2008; Yip et al., 2011; Choi et al., 2013).

Early studies on the relationship between CSR and EM have mainly focused on AEM (Prior et al., 2008). For instance, Kim et al. (2012) found a negative relationship between CSR and both AEM and REM-high CSR engagement reduces both AEM and REM. Lim and Choi (2013) asserted that firms with good CSR activities constrain REM, focusing on the effect of the ethical implication of CSR on financial reporting. Bozzolan et al. (2015) reported that enhanced CSR is likely to discourage REM but encourage AEM because REM undermines firms' long-term value. Conversely, Cohen et al. (2008) and Ewert and Wagenhofer (2005) argued that enhanced CSR may discourage AEM but encourage REM because the probability of detecting AEM will increase as Chinese firms provide more operational information in their CSR disclosure.

Kim et al. (2018) discovered that Chinese firms' enhanced CSR decreases their EM practices. Conversely, SOEs and firms operating in more institutionally developed regions are more likely to engage in REM, while increasing their CSR activities. Therefore, listed firms with enhanced CSR are less likely to engage in earnings management practices through both AEM and REM; thus the second hypothesis as follows:

H2: During the COVID-19 outbreak, listed firms in the most severely affected regions are less likely to manipulate their earnings through both AEM and REM when increasing their CSR activities.

Concerning audit quality, the literature documents varied audit quality between the Big 6 and non-Big 6 audit firms (DeAngelo, 1981). In line with the study by DeAngelo (1981) and Craswell et al. (1995) found the significant premiums earned by the Big 6 audit firms over the non-Big 6 auditing firms to be consistent with the differentiation in the audit quality. A large clientele base and reputed brand name are incentives for the Big 6 auditing firms to detect and constrain earnings management of their clients (MacDonald, 1997). Geiger

and Rama (2006) and Francis and Yu (2009) found that the Big 4 auditors provide higher quality than that of the non-Big 4 auditors. Contrarily, using the Korean data, Jeong and Rho (2004) concluded that there is no difference in audit quality between the Big 6 and non-Big 6 auditors.

Studies on the relationship between the Big 6 auditing firms and accruals have also revealed conservative auditor behaviors (DeFond and Subramanyam, 1998; Francis and Krishnan, 1999). For example, Becker et al. (1998) found evidence of more conservatism in the discretionary accruals of the clients of the Big 6 than those of the non-Big 6 audit firms. Francis and Wang's (2008) worldwide research on the audit quality provided by the Big 4 auditors between 1994 and 2004 showed that the Big 4 auditors provide higher earnings quality and ensure stringent investor protection. Concerning the financial crises, Butler et al. (2004) and Johl et al. (2007) concluded that auditors play an important role in ensuring high quality in financial reports, especially during the crisis periods. For instance, DeAngelo et al. (1994) concluded that managers' choices to manage earning reflect their recognition of the financial difficulties of their companies to avoid a violent discovery of losses. Further, according to Chia et al. (2007), the Big 4 auditing companies contribute toward reducing earnings management, especially during the financial crisis.

In China, since the Big 10 audit firms have greater incentives to protect their integrity and reputation when conducting an audit on listed companies, they maintain a higher audit quality than that of the non-Big 10 audit firms (Chen et al., 2010). Therefore, the Big 10 audit firms take a more conservative approach when auditing listed companies' financial reports in this pandemic scenario. Thus, the following hypothesis is developed:

H3: During the COVID-19 outbreak, listed firms audited by the Big 10 auditors are less likely to engage in earnings manipulation through AEM or REM.

METHODOLOGY

Measurement of earnings management

Based on Kothari et al. (2005) and Kim et al. (2018), the current study used both the performance-adjusted Jones and modified Jones models to calculate the discretionary accruals. According to these models, a firm's total accruals decompose into non-discretionary and discretionary accruals. Specifically, discretionary accruals were estimated by adopting the cross-sectional modified Jones model adjusted for performance.

The non-discretionary accruals were estimated as follows:

$$\frac{Accruals_t}{A_t} = \alpha_0 \left(\frac{1}{A_{t-1}} \right) + \alpha_1 \left(\frac{\Delta Sales_t}{A_{t-1}} \right) + \alpha_2 \left(\frac{PPE_t}{A_{t-1}} \right) + \alpha_3 ROA_t + \varepsilon_t$$

(1)

where *Accruals* = total accruals defined as the change in the non-cash current assets minus the change in the current liabilities excluding the current portion of long-term debt minus depreciation

and amortization; A= the total asset of the firms; Δ*Sales* = the change in sales; Δ*AR* = the changes in net receivables; *PPE* = the property, plant, and equipment; and *ROA* = the net income divided

by the lagged total assets.

Thus, the discretionary accruals were converted into absolute values considered as a proxy for AEM. A higher AEM indicates that firms engage in a higher level of EM through discretionary accruals.

The study also applied the modified Jones model (MAEM) to calculate the discretionary accruals, drawn from Dechow et al. (1995). The model was rewritten by adding a modified sales change variable defined as $\Delta Sales_t - \Delta AR_t$, where ΔAR_t is the change in the accounts receivable. The non-discretionary accruals of the modified Jones model are estimated as follows:

$$\frac{Accruals_t}{A_t} = \alpha_0 \left(\frac{1}{A_{t-1}}\right) + \alpha_1 \left(\frac{\Delta Sales_t - \Delta AR_t}{A_{t-1}}\right) + \alpha_2 \left(\frac{PPE_t}{A_{t-1}}\right) + \alpha_3 ROA_t + \varepsilon_t$$

(2)

Since a firm can also manipulate its earnings through its operations (Roychowdhury, 2006), the study estimated REM through the following three REM measurements: the absolute value of the abnormal cash flow from operations (CFO_t), the absolute value of the abnormal production costs (PC_t), and the absolute value of the abnormal discretionary expenditures (ADE_t), consistent with Kuo et al. (2014) and Bozzolan et al. (2015). The estimations of CFO_t, PC_t, and ADE_t are detailed in Appendix I.

To estimate REM, we applied the following equation suggested by Kim et al. (2018):

$$REM_t = -\alpha_0 CFO_t + \alpha_0 PC_t - \alpha_0 ADE_t + \varepsilon_t$$

(3)

Consistent with Kim et al. (2018), the study developed an aggregate proxy by multiplying -1 for CFO (cash flow from operations) and ADE (abnormal discretionary expenditures) in Equation 4. A high REM indicates that listed firms engage in a higher level of EM through operational changes.

Empirical studies

To assess the impact of the regional pandemic severity on firm's earnings management practices, the study applied the following regression models to test the hypotheses:

$$EM_i = \beta_0 + \beta_1 Mortality_i + \beta_2 Corporate\_governance_i$$
$$+ \beta_3 (Mortality_i \times Corporate\_governance_i) + Control_i + \mu_i$$
$$+ \varepsilon_i$$

(5)

moderation of the CSR performance or the Big 10 auditors on firm's earning management. All control variables in model 5 are consistent with the control variables defined in model 4.

Descriptive statistics

Data were mainly retrieved from the following two sources. First, the pandemic data, as a proxy of the relative provincial pandemic severity, from the China Stock Market & Accounting Research (CSMAR) database scaling the number of provincial COVID-19 deaths by the total number of casualties in China by May 31, 2020. The pandemic death proportion of an average province is around 2.15%. The data on the stock returns and firm characteristics were also gathered from the CSMAR database. Second, CSR scores were obtained from the Chinese Research Data Services Platform (CNRDS), which includes 819 firms' CSR performances in 2019. The major sample contains 2,029 A-share firms listed in the Shanghai and Shenzhen Stock Exchanges, which released financial reports during the pandemic in 2020. The AEM, modified AEM, and REM have the following means: 0.0109, 0.0110, and 0.0253, respectively. The average CSR score of the sampled firms is 6.591, and 53.327% of the sampled firms engage with Big 10

$$EM_i = \beta_0 + \beta_1 Mortality_i + Control_i + \mu_i + \varepsilon_i$$

(4)

where EM_i indicates earnings management practices of the firm i, which includes two proxies-AEM and REM. $Mortality_i$ indicates the number of provincial COVID-19 deaths scaled by the total number of casualties in China. Consistent with the literature (Kim et al., 2018), the study added the firm's one-year lagged control variables including the firm age, leverage ratio, book-to-market ratio, institutional shareholding percentages, Big 10 shareholder's ownership percentages, independent director percentages, Big 10 auditors, audit fee, cash flow growth rate, sales growth rate, ROE, Tobin's Q, and the natural logarithm of firm size. The study controlled the province-level characteristic by adding the legal environment index in our model suggested by Wang et al. (2017). The detailed definitions of variables are shown in Table 1. It also included the industry fixed effect μ_i and cluster the standard error at the industry level to account for the arbitrary serial correlation among industries.

The study also considered the heterogeneous impact of the regional pandemic severity and various firm characteristics on firms' earnings management practices. This was achieved by inserting the firm corporate governance features into the following model: where $Corporate\_governance_i$ indicates two measurements-the CSR scores and the Big 10 auditors from the lagged year. In regions with varied pandemic severities, the coefficient of interest-β_3-shows the auditors. Table 2 lists the summary statistics of all the key variables.

MAIN RESULTS

The main regression results are presented in Table 3. Columns 1 and 2 of Table 3 show that firms in the most severely affected regions increased their discretionary accruals by 34.1% (AEM) and 37.6% (MAEM), which were calculated by applying the Jones and Modified Jones models, respectively. However, in these regions, the REM experienced a statistically significant decline, as shown in Column 3. Quantitatively, a 1% increase in the proportion of pandemic deaths would decrease the REM by 1%. The finding is consistent with our *Hypothesis 1* that the COVID-19 outbreak has exerted varied impacts on the earnings management practices of firms in the most severely affected regions (Dimitras et al., 2015). These results indicate that firms engage in manipulating their accrual-based earnings by inflating their reported

Table 1. Variable's definitions.

Variable	Definitions
AEM	Performance-adjusted Discretionary Accruals based on Jones Model (Kothari et al., 2005)
MAEM	Performance-adjusted Discretionary Accruals based on Modified Jones Model (Kothari et al., 2005)
REM	Real activity-based earnings management
AEM_Choi	Performance-adjusted Discretionary Accruals based on Modified Jones Model (Choi et al., 2011)
MAEM_ Choi	Performance-adjusted Discretionary Accruals based on Modified Jones Model (Choi et al., 2011)
Spread_3	The firm's bid-ask spread over event window [0, 3], as in Corwin and Schultz (2012)
Spread_30	The firm's bid-ask spread over event window [0, 30], as in Corwin and Schultz (2012)
CSR	The firm's CSR scores from the CNRDS
Big 10	A dummy variable that equals to one if the firm's auditor is a big ten auditing firm and zero otherwise
CFO	Operating cash flows divided by lagged total assets
Sales growth	Net sales growth rate
Cash growth	Cash flow growth rate
Leverage	The firm's total debt versus total asset
Book-to-Market ratio	The firm's book value to its market value
Firm Size	The natural logarithm of the firm's total asset
Tobin Q	The ratio between a firm's physical asset's market value and its replacement value
ROA	The firm's net income versus total asset
Age	No. of years since the establishment of the firm
Board size	Size of the board of the firm
Top 10 ownership	The firm's largest ten shareholders' ownership percentage
Institutional ownership	The firm's institutional investor share percentage
IND	The no. of independent directors divided by the total number of directors
Audit fee	The natural logarithm of annual audit fees that firms paid
Mortality	No. of the provincial COVID-19 mortality scaled by the total death in China by May 31st, 2020.
Confirmed	No. of the provincial COVID-19 confirm cases scaled by the total confirm cases in China by May 31st, 2020
Legal environment	Legal environment index of a province

earnings right before the announcement of the financial statements. Since the outbreak of COVID-19 was an unexpected event, the managers may have manipulated their firms' earnings using AEM instead of REM, given that that REM requires managers to manipulate the operational, financial, and investment activities throughout the financial year. Furthermore, the outbreak of COVID-19 has severely affected the economy, and hence the manipulation of cash flows through operational, financial, and investment activities in the most severely affected regions became more difficult and expensive and easily detectable.

Table 4 exhibits the empirical results of two moderating factors-CSR and external Big 10 auditors. Columns 1 to 3 show that, in the most severely affected regions, the earnings management practices (e.g., AEM and REM) are less pronounced for the firms with a higher CSR performance, as measured by the CSR scores. This finding is consistent with *Hypothesis 2*, which highlights the influence of CSR on earnings management manipulation. It is also supported by the finding that firms with a higher CSR performance are less likely to manipulate earnings through both AEM and REM (Kim et

al., 2018). Columns 4 to 6 of Table 4 suggest that firms audited by the Big 10 auditors in the previous year are less likely to engage in manipulating earnings through either AEM or REM, which confirms *Hypothesis 3*. The findings of the current study are in line with the research conducted by Becker et al. (1998), who found similar evidence of a higher accounting conservatism of the Big 10 auditing firms than that of the non-Big 10 auditing firms. They argue that the Big 10 auditing firms have greater incentives to protect their integrity and reputation against any threat of litigations when auditing listed companies.

Robustness check

Alternative proxy for earnings management and pandemic severities

To confirm whether the results are robust, the study adopted the alternative proxies for measuring accrual-based earnings management, consistent with Kim et al. (2018). Thus, it estimated accruals by calculating the

Table 2. Summary statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
AEM	2,029	0.109	0.448	0	13.634
MAEM	2,029	0.110	0.475	0	15.120
AEM_CHOI	2,029	0.092	0.574	0	17.393
MAEM_ CHOI	2,029	0.092	0.625	0	19.680
REM	2,029	-0.025	0.056	-0.738	0.473
Spread_3	2,029	0.002	0.009	-0.025	0.063
Spread_30	2,029	0.003	0.004	-0.012	0.027
Mortality	2,029	0.018	.128	0	0.972
Confirmed	2,029	0.024	.106	0	0.809
Leverage	2,029	0.440	.241	0.014	5.681
Book-to-Market Ratio	2,029	1.429	1.788	0.024	19.322
Sales growth	2,029	-7.300	43.260	-1510.222	0.039
institutional ownership	2,029	0.449	.244	0	0.974
IND	2,029	0.379	0.058	0.250	0.800
Big 10	2,029	0.533	0.499	0	1.000
Top 10 ownership	2,029	0.597	0.155	0	0.972
Firm Size	2,029	22.524	1.441	17.954	28.636
Age	2,029	3.000	.291	1.574	4.122
Cash growth	2,029	-0.157	.658	-13.122	0.917
Tobin's Q	2,029	1.870	1.854	0.692	41.971
ROA	2,029	0.033	0.228	-7.700	4.707
Audit fee	2,029	14.030	0.710	12.206	18.240
Legal environment	2,029	8.738	4.383	0.448	14.854
CSR	819	6.591	2.508	0	11.000

Table 3. The impact of regional pandemic severity on firms' earnings management.

Variable	(1) AEM	(2) MAEM	(3) REM
Mortality	0.341*** (0.022)	0.376*** (0.024)	-0.01** (0.004)
Leverage	0.092** (0.037)	0.115*** (0.031)	0.053*** (0.004)
Book-to-Market ratio	-0.008 (0.006)	-0.008 (0.007)	0.002 (0.001)
Sales growth	0.001 (0.000)	0.000 (0.001)	0.001** (0.000)
Institutional ownership	0.050* (0.025)	0.052* (0.028)	0.021* (0.008)
IND	0.110 (0.129)	0.105 (0.136)	-0.010 (0.040)
Big 10	-0.001 (0.016)	0.001 (0.017)	-0.001 (0.003)
Top 10 ownership	-0.134** (0.052)	-0.140** (0.058)	-0.043*** (0.008)
Firm Size	-0.102*** (0.020)	-0.104*** (0.022)	-0.004* (0.002)
Age	0.034 (0.023)	0.035 (0.024)	0.008 (0.005)
Cash growth	-0.024 (0.035)	-0.033 (0.040)	-0.018** (0.006)
Tobin Q	0.067** (0.030)	0.076** (0.034)	-0.006** (0.002)
ROA	0.131*** (0.033)	0.149*** (0.028)	-0.040** (0.011)
Audit fee	0.059** (0.028)	0.057* (0.028)	0.000 (0.000)
Legal environment	-0.002 (0.001)	-0.002 (0.002)	-0.000 (0.001)
Industry FE	Yes	Yes	Yes
Observations	2,029	2,029	2029
R-squared	0.239	0.245	0.134

Industry fixed effects are included in all estimations. Standard errors, clustered at the industry level, are shown in brackets. The detailed definitions of variables are in Table I. *, **, and *** denote significance at the 10, 5 and 1% level, respectively.

Table 4. The impact of CSR performance and Big 10 auditor on firms' earnings management.

Variable	(1) AEM	(2) MAEM	(3) REM	(4) AEM	(5) MAEM	(6) REM
Mortality×CSR	-0.010***	-0.010***	-0.047***	-	-	-
	(0.002)	(0.003)	(0.007)	-	-	-
Mortality×Big 10	-	-	-	-0.545***	-0.623***	-0.014***
	-	-	-	(0.028)	(0.030)	(0.004)
Leverage	0.113***	0.089***	-0.029	0.091**	0.113***	-0.029
	(0.032)	(0.027)	(0.018)	(0.037)	(0.030)	(0.004)
Book-to-Market ratio	0.001	-0.000	0.003**	-0.008	-0.009	0.003*
	(0.003)	(0.003)	(0.002)	(0.006)	(0.007)	(0.002)
Sales growth	0.000	-0.001	-0.001**	0.001	0.000	-0.001**
	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)
Institutional ownership	-0.026	-0.005	0.014*	0.043	0.043	0.014*
	(0.026)	(0.023)	(0.008)	(0.025)	(0.028)	(0.007)
IND	-0.012	0.019	-0.003	0.094	0.087	-0.005
	(0.045)	(0.050)	(0.027)	(0.128)	(0.135)	(0.026)
Top 10 ownership	-0.012	-0.005	-0.027**	-0.108**	-0.110**	-0.027**
	(0.034)	(0.036)	(0.013)	(0.041)	(0.043)	(0.013)
Firm Size	-0.041***	-0.038***	-0.002	-0.101***	-0.103***	-0.001
	(0.006)	(0.006)	(0.003)	(0.020)	(0.022)	(0.003)
Age	0.017	0.014	0.004	0.035	0.036	0.005
	(0.011)	(0.011)	(0.004)	(0.023)	(0.025)	(0.004)
Cash growth	0.006	0.001	-0.017***	-0.022	-0.031	-0.017***
	(0.005)	(0.007)	(0.006)	(0.033)	(0.038)	(0.006)
Tobin's Q	0.049***	0.044***	-0.005***	0.067**	0.075**	-0.005***
	(0.016)	(0.012)	(0.001)	(0.030)	(0.034)	(0.001)
ROA	0.089**	0.076***	-0.105***	0.131***	0.148***	-0.107***
	(0.033)	(0.026)	(0.029)	(0.033)	(0.028)	(0.028)
Legal environment	-0.002*	-0.001*	-0.000	-0.002	-0.002	-0.000
	(0.001)	(0.001)	(0.000)	(0.002)	(0.002)	(0.000)
Audit fee	0.014	0.011	-0.000	0.057*	0.055*	-0.001
	(0.010)	(0.010)	(0.004)	(0.028)	(0.030)	(0.004)
Big 10	0.004	0.005	0.000	NA	NA	NA
	(0.008)	(0.007)	(0.003)	NA	NA	NA
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	815	815	815	2,029	2,029	2,029
R-squared	0.563	0.600	0.528	0.245	0.253	0.226

Industry fixed effects are included in all estimations. Standard errors, clustered at the industry level, are shown in brackets. The detailed definitions of variables are in Table I. *, **, and *** denote significance at the 10, 5 and 1% level, respectively.

Table 5. Robustness Check 1: Alternative proxy for earnings management for the main results.

Variable	(1) AEM_ CHOI	(2) MAEM_ CHOI
Mortality	0.535***	0.620***
	(0.105)	(0.119)
Leverage	0.303	0.348
	(0.197)	(0.218)
Book-to-market ratio	-0.017*	-0.017*
	(0.008)	(0.009)
Sales growth	0.007	0.007
	(0.005)	(0.006)
Institutional ownership	0.033	0.027
	(0.034)	(0.037)
IND	-0.389*	-0.406*
	(0.209)	(0.216)
Big 10	-0.021	-0.021
	(0.019)	(0.021)
Top 10 ownership	-0.126*	-0.138*
	(0.067)	(0.075)
Firm Size	-0.111***	-0.112***
	(0.038)	(0.040)
Age	0.020	0.019
	(0.026)	(0.029)
Cash growth	-0.074	-0.086
	(0.065)	(0.074)
Tobin Q	0.150	0.171
	(0.104)	(0.121)
ROA	0.116	0.140
	(0.132)	(0.152)
Audit fee	0.075	0.073
	(0.048)	(0.049)
Legal environment	-0.002	-0.002
	(0.002)	(0.002)
Industry FE	Yes	Yes
Observations	2,029	2,029
R-squared	0.253	0.255

difference between a firm's net income and net cash flow (Kim et al., 2018). Subsequently, this was followed by inserting the newly estimated accruals into both the Jones and Modified Jones models to compute new discretional accruals. The results shown in Tables 5 and 6 (the alternative estimations of EM) are consistent with the main findings of the current study.

Next, the study used the confirmed proportion of

Table 6. Robustness Check 2: Alternative proxy for earnings management for the heterogeneous effect.

Variable	(1) AEM_CHOI	(2) MAEM_ CHOI	(3) AEM_CHOI	(4) MAEM_ CHOI
Mortality×CSR	-0.019***	-0.019***	-	-
	(0.005)	(0.005)	-	-
Mortality×Big 10	-	-	-1.131***	-1.322***
	-	-	(0.044)	(0.047)
Leverage	0.084*	0.079*	0.296	0.338
	(0.044)	(0.044)	(0.190)	(0.209)
Book-to-market ratio	-0.007	-0.008	-0.016*	-0.016
	(0.006)	(0.005)	(0.009)	(0.010)
Sales growth	-0.003	-0.002	0.007	0.008
	(0.003)	(0.003)	(0.006)	(0.006)
Institutional ownership	0.002	0.005	0.013	0.003
	(0.024)	(0.025)	(0.043)	(0.050)
IND	-0.040	-0.029	-0.394*	-0.413*
	(0.066)	(0.062)	(0.214)	(0.223)
Top 10 ownership	0.009	0.007	-0.091*	-0.098*
	(0.027)	(0.030)	(0.051)	(0.056)
Firm size	-0.032***	-0.032***	-0.113***	-0.114***
	(0.006)	(0.006)	(0.039)	(0.041)
Age	0.016	0.017	0.019	0.019
	(0.013)	(0.014)	(0.026)	(0.029)
Cash growth	-0.006	-0.008	-0.072	-0.083
	(0.011)	(0.011)	(0.062)	(0.070)
Tobin Q	0.000	0.001	0.149	0.170
	(0.003)	(0.003)	(0.104)	(0.120)
ROA	0.059	0.062*	0.116	0.139
	(0.035)	(0.032)	(0.130)	(0.149)
Audit fee	0.002	0.003	0.075	0.072
	(0.010)	(0.010)	(0.048)	(0.049)
Legal environment	-0.002	-0.002*	-0.003	-0.002
	(0.001)	(0.001)	(0.002)	(0.002)
Big 10	0.008	0.006	NA	NA
	(0.008)	(0.008)	NA	NA
Industry FE	Yes	Yes	Yes	Yes
Observations	815	815	2029	2029
R-squared	0.347	0.345	0.267	0.270

Industry fixed effects are included in all estimations. Standard errors, clustered at the industry level, are shown in brackets. The detailed definitions of variables are in Table I. *, **, and *** denote significance at the 10, 5 and 1% level, respectively.

provincial COVID-19 deaths as an alternative proxy of the regional pandemic seriousness. This was consistent with the previous findings of the current study as exhibited in Tables 7 and 8.

Difference-in-differences approach

To control for the temporal effect, the study applied a difference-in-differences approach (DID) by including the firm's AEM and REM in the previous year (that is, 2019) and comparing them with those made during the pandemic period. Specifically, the following DID model was used:

$$\text{EM}_{\text{it}} = \beta_0 + \beta_1 (\text{Post}_t \times \text{Mortality}_i) + \beta_2 \text{Control}_i + \mu_i + \lambda_i + \eta_t + \varepsilon_i \qquad (6)$$

where Post_t is a dummy variable and equals one if the financial report is announced in 2020, and zero otherwise. The industry fixed effect (μ_i), province fixed effects (λ_i), and year fixed effects (η_t) are also included to relieve the possible time-invariant province characteristics and time-varying economic conditions during the sampled periods. It must be noted that Post_t and Death_i are absorbed by the time and province fixed effects, respectively, and are thus omitted in Equation 6. The standard error is clustered at the industry level. As presented in Table 9, the DID estimates ($\text{Post}_t \times \text{Death}_i$) are still significant after controlling for the province and year fixed effects. Table 10 shows that all the previous moderating effects from CSR performance and Big 10 auditor are robust to this alternative setting. Overall, the baseline results hold when considering unobserved regional and time fixed effects.

DISCUSSION

The effect of ownership structure on the earnings management during the pandemic period

The study explored the heterogeneous effect of the ownership structure on the earnings management practices of the listed firms. Columns 1 to 3 of Table 11 show that the firms with higher ownership concentration are more likely to engage in AEM and less likely to use REM during the COVID-19 outbreak, which is supported by the findings from Kim and An (2018). This indicates that the controlling shareholders' cash flow rights are more concentrated and that they can expropriate the value of minority shareholders based on higher AEM. However, REM might lead to more distortions in firms' operations, and hence the controlling shareholders are more likely to reduce the use of REM as the disparity is perceived to grow. In Table 11, Columns 4 to 6 show that the SOEs are more likely to engage in AEM and less

likely to engage in REM during the COVID-19 outbreak, which is consistent with the findings from Ding et al. (2007).

The effect of the release of the financial report on the information asymmetry during the pandemic period

It is worth considering the effect of the release of the financial report on information asymmetry during the COVID-19 outbreak, since previous findings of the current study have shown that the firms have attempted different earnings management practices in regions with different pandemic severities. Based on the previous studies, such as Fong et al. (2017) and Nagar et al. (2019), the study adopted the daily bid-ask spread as the proxy for information asymmetry, calculation of daily bid-ask spread, drawn from Corwin and Schultz (2012). Columns 1 and 2 of Table 12 show that, after the financial disclosure, the short-term (3 days) information asymmetry levels shrink and the longer term (30 days) information asymmetry levels increase in firms in the most severely affected areas. These findings indicate the short- and long-term effects of the EM practices on the market-based information asymmetry levels during the pandemic, which is in line with the conclusions in Choi et al. (2011). Columns 3 to 6 of Table 12 confirm that the CSR performance and Big 10 auditors can reduce both the short- and long-term information asymmetries of firms after the outbreak of a pandemic. This finding is supported by studies such as Cui et al. (2018) and Pittman and Fortin (2004).

Conclusion

This study investigated the relationship between the COVID-19 outbreak and the Chinese listed firms' earnings management practices. It also examined how this relationship was moderated by the listed firms' CSR and the external corporate governance mechanism.

Since the COVID-19 outbreak was unexpected, studies on COVID-19 have mainly focused on the market reactions to the pandemic. Currently, there is limited research on the relationship between the COVID-19 outbreak and earnings management practices, especially in China. Further, research conducted in China provides inconclusive and contradictory conclusions on the CSR-EM relationship. In China, there is limited study on how auditors moderate the impact from external shocks on earnings management. To fill these gaps in the extant literature, the current study provided some meaningful thoughts to the policymakers and academics for future considerations.

The results revealed that listed firms in the most severely affected regions were more likely to engage in AEM and less likely to engage in REM. The additional

Table 7. Robustness Check 3: Alternative proxy for the regional pandemic severity for the main results.

Variable	(1) AEM	(2) MAEM	(3) REM
Confirmed	0.412***	0.456***	-0.013***
	(0.027)	(0.029)	(0.004)
Leverage	0.093**	0.116***	0.055***
	(0.037)	(0.031)	(0.013)
Book-to-Market ratio	-0.009	-0.009	0.003*
	(0.006)	(0.007)	(0.002)
Sales growth	0.001	0.000	-0.001***
	(0.000)	(0.001)	(0.000)
Institutional ownership	0.048*	0.050*	0.020**
	(0.025)	(0.028)	(0.009)
IND	0.105	0.099	-0.013
	(0.128)	(0.135)	(0.027)
Big 10	-0.003	-0.000	-0.001
	(0.016)	(0.017)	(0.003)
Top 10 ownership	-0.130**	-0.136**	-0.041**
	(0.051)	(0.056)	(0.016)
Firm Size	-0.101***	-0.103***	-0.004
	(0.020)	(0.022)	(0.004)
Age	0.035	0.035	0.009**
	(0.023)	(0.024)	(0.004)
Cash growth	-0.024	-0.033	-0.018***
	(0.035)	(0.040)	(0.005)
Tobin Q	0.067**	0.075**	-0.007**
	(0.030)	(0.034)	(0.003)
ROA	0.131***	0.149***	-0.052*
	(0.033)	(0.028)	(0.028)
Legal environment	-0.003	-0.002	0.000
	(0.001)	(0.002)	(0.000)
Audit fee	0.059**	0.057*	-0.001
	(0.028)	(0.029)	(0.005)
Industry FE	Yes	Yes	Yes
Observations	2,029	2,029	2029
R-squared	0.240	0.246	0.355

analysis on the moderating effect of CSR and external corporate governance, measured by the Chinese Big 10 auditors, on the baseline finding demonstrates that, in the most severely affected regions, both AEM and REM are

Table 8. Robustness Check 4: Alternative proxy for the regional pandemic severity for the heterogeneous effect.

Variable	(1)	(2)	(3)	(4)	(5)	(6)
	AEM	MAEM	REM	AEM	MAEM	REM
Confirmed×CSR	-0.012***	-0.012***	-0.057***	-	-	-
	(0.003)	(0.003)	(0.009)	-	-	-
Confirmed×Big 10	-	-	-	-0.663***	-0.759***	-0.016***
	-	-	-	(0.038)	(0.041)	(0.005)
Leverage	0.113***	0.089***	-0.029	0.091**	0.113***	-0.029
	(0.032)	(0.027)	(0.018)	(0.037)	(0.030)	(0.018)
Book-to-market ratio	0.001	-0.000	0.003**	-0.008	-0.009	0.003*
	(0.003)	(0.003)	(0.002)	(0.006)	(0.007)	(0.002)
Sales growth	0.000	-0.001	-0.001**	0.001	0.000	-0.001**
	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)
Institutional ownership	-0.026	-0.005	0.014*	0.043	0.044	0.014*
	(0.026)	(0.023)	(0.008)	(0.025)	(0.028)	(0.007)
IND	-0.013	0.018	-0.003	0.093	0.086	-0.005
	(0.045)	(0.050)	(0.027)	(0.128)	(0.135)	(0.026)
Top 10 ownership	-0.012	-0.005	-0.027**	-0.108**	-0.110**	-0.027**
	(0.034)	(0.036)	(0.013)	(0.041)	(0.043)	(0.013)
Firm size	-0.041***	-0.038***	-0.002	-0.102***	-0.104***	-0.001
	(0.006)	(0.006)	(0.003)	(0.020)	(0.022)	(0.003)
Age	0.017	0.014	0.004	0.035	0.036	0.005
	(0.011)	(0.011)	(0.004)	(0.023)	(0.025)	(0.004)
Cash growth	0.006	0.001	-0.017***	-0.022	-0.031	-0.017***
	(0.005)	(0.007)	(0.006)	(0.033)	(0.038)	(0.006)
Tobin Q	0.049***	0.044***	-0.005***	0.067**	0.075**	-0.005***
	(0.016)	(0.012)	(0.001)	(0.030)	(0.034)	(0.001)
ROA	0.089**	0.076***	-0.105***	0.130***	0.148***	-0.107***
	(0.033)	(0.026)	(0.029)	(0.033)	(0.028)	(0.028)
Legal environment	-0.002*	-0.001*	-0.000	-0.003*	-0.002	-0.000
	(0.001)	(0.001)	(0.000)	(0.002)	(0.002)	(0.000)
Audit Fee	0.014	0.011	-0.000	0.058*	0.055*	-0.001
	(0.010)	(0.010)	(0.004)	(0.029)	(0.030)	(0.004)
Big 10	0.004	0.005	0.000	NA	NA	NA
	(0.008)	(0.007)	(0.003)	NA	NA	NA
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,642	4,065	4,065	1,623	4,026	4,026
R-squared	0.186	0.215	0.213	0.279	0.233	0.231

Table 9. Robustness Check 5: Difference-in-differences approach for the main results.

Variable	(1) AEM	(2) MAEM	(3) REM
Mortality*Post	0.447***	0.480***	0.011**
	(0.021)	(0.013)	(0.005)
Leverage	0.241***	0.187***	0.040
	(0.061)	(0.045)	(0.025)
Book-to-Market ratio	0.004	0.002	0.009***
	(0.005)	(0.005)	(0.003)
Sales growth	0.000	0.000	-0.000
	(0.000)	(0.000)	(0.000)
Institutional ownership	0.032*	0.029	0.054***
	(0.018)	(0.021)	(0.018)
IND	0.118	0.149	-0.032
	(0.104)	(0.119)	(0.040)
Big 10	-0.007	-0.002	-0.006
	(0.016)	(0.014)	(0.006)
Top 10 ownership	-0.169***	-0.111***	-0.081**
	(0.040)	(0.032)	(0.031)
Firm size	-0.138***	-0.119***	-0.001
	(0.017)	(0.014)	(0.005)
Age	0.036	0.035	0.021**
	(0.021)	(0.022)	(0.009)
Cash growth	0.002	-0.005	-0.020***
	(0.007)	(0.005)	(0.003)
Tobin Q	0.055***	0.058***	-0.014***
	(0.014)	(0.016)	(0.004)
ROA	0.195***	0.238***	-0.730***
	(0.047)	(0.053)	(0.118)
Industry FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Province FE	Yes	Yes	Yes
Observations	4,028	4,028	4028
R-squared	0.237	0.253	0.159

Industry, Month×Year, and Province fixed effects are included in all estimations. Standard errors, clustered at the industry level, are shown in brackets. The detailed definitions of variables are in Table I. *, **, and *** denote significance at the 10, 5 and 1% level, respectively.

less pronounced for the firms engaged in a high level of CSR activities. Finally, firms audited by the Big 10 auditors would be less likely to manipulate earnings through either AEM or REM.

Table 10. Robustness Check 6: Difference-in-differences approach for the heterogeneous effect.

Variable	(1) AEM	(2) MAEM	(3) REM	(4) AEM	(5) MAEM	(6) REM
Mortality×Post×CSR	-0.029***	-0.008***	-0.008***	-	-	-
	(0.001)	(0.001)	(0.003)	-	-	-
Mortality×Post×Big 10	-	-	-	-0.762***	-0.795***	-0.329***
	-	-	-	(0.038)	(0.025)	(0.017)
Leverage	0.191	0.138	0.125***	0.240***	0.186***	0.084***
	(0.222)	(0.051)	(0.041)	(0.062)	(0.046)	(0.019)
Book-to-Market ratio	0.009*	0.006	0.003	0.004	0.002	0.013***
	(0.002)	(0.005)	(0.004)	(0.005)	(0.005)	(0.003)
Sales growth	0.000	-0.000**	-0.000	0.000	0.000	-0.002*
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)
Institutional ownership	-0.010*	-0.011	0.030	0.030	0.027	0.086***
	(0.003)	(0.020)	(0.036)	(0.019)	(0.021)	(0.020)
IND	-0.171	-0.012	-0.104*	0.114	0.144	-0.025
	(0.127)	(0.037)	(0.059)	(0.103)	(0.119)	(0.048)
Big 10	-0.002	0.006	-0.015	-0.025	-0.012	-0.008
	(0.007)	(0.002)	(0.013)	(0.023)	(0.017)	(0.006)
Top 10 ownership	-0.110	0.003	-0.045	-0.161***	-0.100***	-0.139***
	(0.084)	(0.006)	(0.045)	(0.039)	(0.027)	(0.034)
Firm Size	-0.105	-0.080	0.012	-0.138***	-0.120***	-0.013
	(0.061)	(0.034)	(0.009)	(0.017)	(0.014)	(0.008)
Age	0.000	0.014	0.013	0.036	0.035	0.021**
	(0.026)	(0.006)	(0.013)	(0.021)	(0.022)	(0.009)
Cash growth	0.020	0.002	-0.026**	0.002	-0.005	-0.024***
	(0.014)	(0.001)	(0.011)	(0.007)	(0.005)	(0.004)
Tobin Q	0.049***	0.045***	-0.025***	0.055***	0.058***	-0.015***
	(0.003)	(0.002)	(0.009)	(0.014)	(0.016)	(0.005)
ROA	-0.094	0.120	-0.241*	0.193***	0.236***	-0.203*
	(0.063)	(0.049)	(0.122)	(0.046)	(0.053)	(0.116)
Audit fee	0.062	0.040	-0.023**	0.067***	0.049***	0.000
	(0.044)	(0.023)	(0.011)	(0.020)	(0.018)	(0.011)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,639	1,639	1,639	4,028	4,028	4,028
R-squared	0.259	0.321	0.161	0.240	0.257	0.106

Table 11. Discussion 1: The mitigating effect from ownership structure.

Variable	(1) ADC1	(2) ADC3	(3) REM	(4) ADC1	(5) ADC3	(6) REM
Mortality×Post×Top 10 ownership	-3.298***	-3.423***	0.140***	-	-	-
	(0.053)	(0.061)	(0.039)	-	-	-
Mortality×Post ×SOE	-	-	-	0.756***	0.831***	-0.020*
	-	-	-	(0.027)	(0.020)	(0.003)
Leverage	0.199	0.185*	0.090***	0.235***	0.180***	0.037
	(0.151)	(0.056)	(0.018)	(0.062)	(0.045)	(0.056)
Book-to-Market ratio	0.006	0.001	0.014***	0.004	0.002	0.009
	(0.010)	(0.010)	(0.003)	(0.005)	(0.005)	(0.008)
Sales growth	0.000*	0.000	-0.001	0.000*	0.000	-0.001
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)
Institutional ownership	0.037	0.026	0.089***	0.036	0.040	0.057
	(0.020)	(0.022)	(0.019)	(0.032)	(0.028)	(0.047)
IND	0.118*	0.139*	-0.024	0.125	0.155	-0.013
	(0.029)	(0.037)	(0.048)	(0.105)	(0.121)	(0.004)
Big 10	-0.006	0.002	-0.009	-0.006	0.000	-0.011
	(0.007)	(0.007)	(0.006)	(0.016)	(0.014)	(0.010)
Firm Size	-0.137**	-0.119***	-0.014*	-0.138***	-0.119***	-0.013
	(0.028)	(0.009)	(0.008)	(0.017)	(0.013)	(0.011)
Age	0.036**	0.036***	0.023**	0.040*	0.041*	0.004
	(0.006)	(0.003)	(0.009)	(0.021)	(0.023)	(0.001)
Cash growth	0.010	-0.004**	-0.025***	0.002	-0.005	-0.021
	(0.010)	(0.001)	(0.005)	(0.007)	(0.005)	(0.004)
Tobin Q	0.054**	0.057**	-0.017***	0.054***	0.057***	-0.013
	(0.009)	(0.013)	(0.005)	(0.014)	(0.016)	(0.005)
ROA	0.253**	0.231*	-0.109	0.194***	0.236***	-0.193
	(0.037)	(0.064)	(0.070)	(0.047)	(0.053)	(0.067)
Audit fee	0.070***	0.052**	-0.001	0.068***	0.050***	0.007
	(0.005)	(0.008)	(0.011)	(0.018)	(0.016)	(0.007)
Constant	2.079*	1.809**	0.298***	2.003***	1.807***	0.262
	(0.517)	(0.309)	(0.087)	(0.218)	(0.168)	(0.195)
Industry Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Province Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,028	4,028	4,028	4,028	4,028	4,028
R-squared	0.243	0.264	0.104	0.241	0.260	0.084

Robust standard errors in parentheses. ***p<0.01, **p<0.05, *p<0.1. Industry fixed effects are included in all estimations. Standard errors, clustered at the industry level, are shown in brackets. The detailed definitions of variables are in Table I. *, **, and *** denote significance at the 10, 5 and 1% level, respectively.

Table 12. Discussion 2: The impact of pandemics on information asymmetry level.

Variable	(1) Spread_3	(2) Spread_30	(3) Spread_3	(4) Spread_30	(5) Spread_3	(6) Spread_30
Mortality	-0.013***	0.008***	-	-	-	-
	(0.005)	(0.002)	-	-	-	-
Mortality*CSR	-	-	-0.011***	-0.003***	-	-
	-	-	(0.004)	(0.001)	-	-
Mortality*Big 10	-	-	-	-	-0.048***	-0.011***
	-	-	-	-	(0.007)	(0.004)
Leverage	0.009	0.005	0.016	-0.006	0.009	0.005
	(0.010)	(0.005)	(0.025)	(0.008)	(0.010)	(0.005)
Book-to-Market ratio	-0.002	-0.001	0.001	-0.001*	-0.002	-0.001
	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)
Sales growth	-0.000	-0.000	-0.000	0.000*	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Institutional ownership	-0.019*	-0.007	-0.033	0.005	-0.019*	-0.007
	(0.010)	(0.006)	(0.024)	(0.008)	(0.010)	(0.006)
IND	-0.034	0.019	-0.043	0.005	-0.035	0.019
	(0.034)	(0.028)	(0.042)	(0.021)	(0.034)	(0.028)
Big 10	-0.003	-0.003*	-0.008	-0.003	-0.002	-0.003
	(0.004)	(0.002)	(0.006)	(0.004)	(0.004)	(0.002)
Top 10 ownership	-0.009	0.011	-0.015	-0.007	-0.007	0.012
	(0.017)	(0.008)	(0.027)	(0.012)	(0.016)	(0.008)
Firm Size	0.002	0.003**	0.001	0.003	0.002	0.003**
	(0.003)	(0.001)	(0.004)	(0.002)	(0.003)	(0.001)
Age	-0.007	0.004	-0.015	0.004	-0.007	0.004
	(0.008)	(0.003)	(0.013)	(0.005)	(0.008)	(0.003)
Cash growth	-0.008**	-0.000	-0.001	-0.002	-0.008**	-0.000
	(0.003)	(0.002)	(0.007)	(0.005)	(0.003)	(0.002)
Tobin Q	-0.000	0.000	0.004***	0.003***	-0.000	0.000
	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
ROA	0.025***	-0.003	0.036**	-0.004	0.025***	-0.003
	(0.006)	(0.003)	(0.017)	(0.006)	(0.006)	(0.003)
Audit fee	0.006	-0.003	0.000	-0.002	0.006	-0.003
	(0.005)	(0.002)	(0.005)	(0.003)	(0.005)	(0.002)
Legal environment	0.001	0.000	0.001	-0.000	0.001	0.000
	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,029	2,029	851	851	2,029	2,029
R-squared	0.141	0.063	0.200	0.162	0.142	0.063

Industry fixed effects are included in all estimations. Standard errors, clustered at the industry level, are shown in brackets. The detailed definitions of variables are in Table I. *, **, and *** denote significance at the 10, 5 and 1% level, respectively.

The findings of this research could help Chinese authorities, listed firms, and market investors gain more understanding about earnings management practices during a negative shock and under various internal and external factors influencing the quality of financial reporting. In addition, the findings may also provide significant implications for earnings management for academics interested in other emerging markets.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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APPENDIX I

Estimating the abnormal cash flow from operations

The following equation is used to estimate the normal level of cash flow from operations (CFO), based on all the firm-year observations in the same industry.

$$\frac{\text{CFO}_t}{\text{TA}_t} = \alpha_0 \left(\frac{1}{\text{TA}_{t-1}}\right) + \alpha_1 \left(\frac{Sales_t}{\text{TA}_{t-1}}\right) + \alpha_2 \left(\frac{\Delta Sales_t}{\text{TA}_{t-1}}\right) + \varepsilon_t$$

where CFO, TA, Sales, and ΔSales represent a firm's cash flow from operations, the total assets, net sales, and the change in the net sales, respectively. Thus, abnormal CFO (that is, ab_CFO) is calculated by subtracting the actual CFO from the normal CFO using the above estimation model.

Estimating the abnormal production levels

The following equation is used to estimate the normal production cost (PC), based on all the firm-year observations in the same industry.

$$\frac{\text{PC}_t}{\text{TA}_t} = \alpha_0 \left(\frac{1}{\text{TA}_{t-1}}\right) + \alpha_1 \left(\frac{Sales_t}{\text{TA}_{t-1}}\right) + \alpha_2 \left(\frac{\Delta Sales_t}{\text{TA}_{t-1}}\right) + \alpha_3 \left(\frac{\Delta Sales_{t-1}}{\text{TA}_{t-1}}\right) + \varepsilon_t$$

Thus, abnormal PC (that is, ab_PC) is calculated by subtracting the actual PC from the normal PC using the above estimation model.

Estimating the abnormal levels of discretionary expenditure

The following equation is used to estimate the normal level of discretionary expenditure (DE), based on all the firm-year observations in the same industry.

$$\frac{\text{DE}_t}{\text{TA}_t} = \alpha_0 \left(\frac{1}{\text{TA}_{t-1}}\right) + \alpha_1 \left(\frac{Sales_{t-1}}{\text{TA}_{t-1}}\right) + \varepsilon_t$$

Thus, abnormal DE (that is, ab_DE) is calculated by subtracting the actual DE from the normal DE using the aforementioned estimation model.