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ORIGINAL ARTICLE

The impact of audit quality on real earnings management: evidence from Bangladesh

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Abstract

We present empirical evidence regarding the association between audit quality and real earnings management in case of the capital market of Bangladesh. Our analysis visualizes a panel of 2195 firm data with year-level observations which are listed on the Dhaka Stock Exchange throughout the period of 2000–2017. We report inverse association between 'big 4' audit firms' service and levels of real earnings management practices. This result suggests that the client pool of big audit firms are less likely to engage in earnings management. This particular result is also consistent with the 'big 4' audit firms' commitment to their reputation and long track-records of noted exhibition of due diligence. Also, we find no association between industry-specialized auditor (in terms of audited assets) and real earnings management. This result provides important insights to the nature of competition in the audit market of Bangladesh. Finally, we also observe no correlation between audit specialization (in terms of audited revenue) and real earnings management. This pattern invokes significant findings regarding the industrial depth of specialization of Bangladeshi firms. It also uncovers whether 'specialized' provision of audit service can meaningfully serve the more 'generalized' nature of industrial composition of the firms active in the capital market of the country.

Keywords Real earnings management · Audit quality · Corporate governance

Introduction

Bangladesh has graduated from the category of 'least-developed countries' to the status of a 'developing country' back in 2018 (Khatun 2018). Bangladesh achieved this recognition from United Nation with respect to compliance to all of the three requirements for graduation (GNI Per Capita, Human Assets Index and Economic Vulnerability Index). The country has maintained more than six percent average GDP growth rate in last 10 years (MOF 2018). The International Monetary Fund (IMF) predicts that Bangladesh will be able to maintain the growth rate (Ahasan 2019). For the coming years. PricewaterhouseCoopers expect that by maintaining this growth rate, Bangladesh's economy will be the 23rd largest in the world by 2050. Despite the episodes of developmental success story of Bangladesh, the capital market of Bangladesh is widely regarded as inefficient to supply the required funds for burgeoning corporate sector.

During the last seven years, Performance of Bangladesh Capital market has not been consistence with developments in the macro-economic realm. In 1st July, 2010, General Index of Dhaka Stock Exchange was 6153 and in 1st July 2017, it was 5654. During this period, there was a decrease of five hundred points, yet GDP growth rate was more than 6.5 percent on average. There may be different reasons underlying this anomaly. In 2010, Bangladesh Capital Market witnessed a massive downside of its indexes. Government formed an investigation committee to find out the reasons for this unusual drive of the market. This committee mentioned different reasons for such anomalous behavior of the market. One of the reasons mentioned was that listed companies lack transparency and accountability in corporate financial reporting. It is also to be noted that emerging economies are characterized by poorly defined property rights and weak rule of law (La Porta et al. 1999), weak investor protection and low quality government (La Porta et al. 2000), lack of freedom of the press (Azmat and Coghill 2005) and poor financial transparency (Fan, Wei and Xu, 2011). As an archetype of emerging countries, Bangladesh is

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no exception. Khan (2003) documents that Bangladesh possesses myriad features of an emerging economy, including widespread corruption, poor rule of law, lack of accountability and transparency and low-quality public governance.

Auditors play a decisive role to insist the companies to present their financial statement accurately. But, World Bank mentioned that auditors of Bangladesh have not been performing with highest standards of professionalism (World Bank 2015). So, one of the reason of this inefficient functioning of capital market may be that listed companies are not providing their respective financial statements with proper accuracy, while auditor are not delivering high-quality audit service. If an auditor has expertise and intention to perform high-quality auditing service, they can limit the respective client's management bodies from earnings management activities and may also insist to present their financial statement with transparency and fairness. In light of the previous discussion, it is of great importance to uncover the effect of audit quality on earnings management in Bangladesh. This study aims to undertake this exact phenomenon.

In the context of Bangladesh, as to the our best knowledge, only Kabir et al. (2011) performed a study on the impact of auditors' affiliation to the 'big four' audit firms on accrual quality. Our study has been projected to analyze this issue from there different perspectives. First, to measure audit quality, they only consider big and non-big auditors performance. Defond & Zhang (2014) document different proxies of audit quality (e.g., big N audit firms, industry specialization, audit fee, going concern opinion, restatements, meet/beat, market reaction, cost of capital). The present study includes 'big N' firms and auditor's industry specialization to measure audit quality. Second, they took accrual quality to measures earnings management. Graham et al. (2005) state that managers like real earnings management (REM) activities compared to accrual-based earnings management because management receives extensive flexibility in real earnings management when compared to accrual earnings management. With our views in concern, we consider real earnings activities to measure earnings managements. Third, they analyzed data from 2000 to 2003 when corporate governance guide lines had not been issued yet. This study has been conducted with a much holistic dataset from 2000 to 2017 period. It is also noteworthy that Bangladesh Securities and Exchange Commission has since issued corporate governance guidelines in 2006 and revised guidelines in 2012, thus making the 2000–2017 period a rather interesting panel of events.

The remainder of the paper is presented as follows. Section "An overview of the Bangladesh audit market" reviews the characteristics of the Audit Market of Bangladesh, (Earnings management (EM)" Section discusses regarding research issues related to earnings management, "Audit quality and earnings management" Section demonstrates relevant review of literature and develops pertinent hypotheses, "Research methodology" Section provides the relevant research methodological, "Result" Section summarizes the major findings and provides new directions to further research, and "Conclusion" Section presents the concluding remarks.

An overview of the Bangladesh audit market

With respect to monitoring and enforcing of financial reporting, there exists six regulators-The Institute of Chartered Accountants of Bangladesh (ICAB), Bangladesh Securities and Exchange Commission (BSEC), Registrar of Joint Stock Companies (RJSC), Bangladesh Bank (BB), Monitoring Cell of the Ministry of Finance (MoF) and Insurance Development and Regulatory Authority (IDRA). These authorities play significant roles to ensure transparency and accountability of the reported companies. Particularly, ICAB regulates audit firms to ensure that financial statements are prepared in accordance with prevailing set of accounting standards. A joint study conducted by World Bank and IMF (on observance of standards and codes—Accounting and Auditing, ROSC A&A, 2003) and observed a compliance gap between actual and standard disclosure of financial statement. They provided some recommendation to ensure the quality of corporate financial reporting (World Bank 2003) hereby including to adopt International Financial Reporting Standards (IFRSs) by ICAB without any modification.

World Bank mentioned that authorities in Bangladesh have implemented some recommendations successfully (World Bank 2015). Considering the 2003 ROSC A&A recommendations, ICAB established quality assurance department, increased capacity of investigation and disciplinary committee and introduced various important public interest subject by means of their continuing professional development program. Similarly, after the disastrous crash of the stock market in 2010, BSEC restructured its organization and market surveillance activities. They also introduced corporate governance guidelines for all listed companies in Dhaka Stock Exchange (DSE) and Chittagong Stock Exchange (CSE). World Bank recommended for future policy implementation that will strengthen the financial reporting quality, ensure accountability and transparency and enhance for sustainable economic growth. To comply with these recommendation, Bangladesh has to ensure better regulatory framework, increase the capacity of regulatory bodies, enrich education curriculum and arranging training and follow integrated reporting. For high quality assurance service, quality people, regular monitoring and appropriate training are also deemed essential (World Bank 2015).

In perspective, due to facing excessive competition, auditors do not charge high fees for their assurance service. Audit

firms, henceforth, are not able to retain or hire eligible skill or expert manpower. In this context, auditors are not always capable to deter management from earnings management practices. Moreover, Auditors may not have incentives to constrain management from earnings management activities due to fear of losing clients. Size of the audit market and ability of the audit firms may also inhibit audit quality. World Bank has raised its concern for adopting three different versions of financial statement by the same company for the same year (World Bank 2015). ROSC A&A recommended for Financial Reporting Council (FRC). Recent stock market scam induced the different stakeholders to raise the issue of high-quality audit report and to demand for oversight the activities of auditors by the third-party regulatory bodies. Under similar auspices, Government of Bangladesh has formed Financial Reporting Council (FRC). The main objectives of FRC are to improve the financial reporting quality and to ensure the better financial reporting transparency. FRC is expected to set the accounting and auditing standards and monitoring the activities of professional accountants in order to oversee the accomplishment of its stated objectives the activities of auditors. FRC should also emphasize on its oversight activities (enforcement and overseeing inspection), and ICAB must also be enabled to undertake greater scope of functions in terms of professional regulatory activities (World Bank 2015).

High levels of competition, lack of expertise and lower levels of audit fees present a motivating scenario to observe the association between audit quality (measured by big audit firms and industry specialization) and earnings management. Prior studies suggest that big audit firms can increase the audit quality, and industry expertise of auditors helps to reduce earnings management and increase earnings quality (Beasley and Petroni 2001; Balsam, Krishnan and Yang, 2003; Chang and Sun 2009; Gul et al. 2010; Chen et al. 2011). Under competition, if regulatory framework is considered weak, the level by which that big N audit firms or audit firms with industrial expertise can limit the earnings management behavior is open to questions.

Earnings management (EM)

There exists no general consensus on the definitions and characteristics of EM (Beneish 2001). Healy & Wahlen (1999) defined EM as "Earnings management occurs when managers use judgment in financial reporting and in structuring transactions to alter financial reports to either mislead some stakeholders about the underlying economic performance of the company or to influence contractual outcomes that depend on reported economic numbers". Their definition reveals several pertinent aspects. Firstly, the management can manage earnings through individual judgment. For example, they can apply their judgment to estimate depreciation. Secondly, they can mislead the different stakeholder regarding the true economic outcomes of the firms. It may occur when the management access information and alter it from unethical motives which are not accessible by outsiders. A study of Chiu et al. (2012) document that earnings management is like a virus that spreads from one firm to another through board associates of common directorships. These common directors are acting like virus carriers in the sense that the directors of the infected earnings management firms carry these earnings management attitude to another firms on whose boards they also sit on.

Due to the separation of ownership and management, investors are supposed to rely on the information as provided and authorized by the management. Scott (2000) categorizes EM in two different ways: efficient EM and opportunistic EM. Subramanyam (1996) and (Balsam, Krishnan and Yang, 2003) explain of the behavior of efficient perspective of EM. As a proxy of EM, they took discretionary accruals, discretionary accruals have a significant and positive relationship with future earnings of the firms. Consequentially, Burgstahler & Dichev (1997) and Balsam et al. (2002) provided evidence reliable with opportunistic EM behavior. Management is getting discretion while selecting accounting methods or estimations (Schipper 1989; Bradshaw et al. 2001). So, management has the opportunity to present financial reports in a direction desirable to them (Jensen 2001). This strand of opportunistic behavior of management could result into provisional resource misallocation and related problems (Bradshaw et al. 2001). The two most common features for firms engaging in opportunistic behavior are pressure and opportunity (Zahra et al. 2005). First, senior managers endure in continuous market pressures to encounter and surpass financial aims, as well as financial analysts' anticipations (Caton et al. 2001). Second, executives may exploit their advantages related to information to manipulate earnings for their own interest (Zahra et al. 2005). Previous studies affirm substantial evidence that top executives engage in EM (Defond et al. 1994a, b; Guidry et al. 1999; Healy 1985; Teoh, Welch, & Wong, 1998; Teoh et al. 1998a, b).

Management can manipulate the financial statement in divergent ways. One of them is by manipulating accrual (discretionary accrual, also known as abnormal accrual) without affecting cash flow. Higher discretionary accrual indicated more EM. There are different models to find out the discretionary accrual, such as the Jones model (Jones 1991), the modified Jones model ('Dechow_et_al_1995.pdf', no date), the modified Jones model due to (DeFond and Subramanyam 1998) the modified Jones model due to (Larcker and Richardson 2004) and followed by the modified Jones model with return on assets included as a new independent variable as due to (Kothari et al. 2005). In addition, prior studies argue that by testing accrual quality, we can

measure EM. EM has been measured by taking operating cash flows into consideration. (Dechow & Dichev 2002). Firms' management can perform manipulation by affecting real activity decision. Several studies conducted to examine that the REM have mainly focused on investment activities (Bens, Nagar, & Wong 2002; Bushee 1998; Dechow & Sloan 1991). Roychowdhury (2006) defined REM as "management actions that deviate from normal business practices, undertaken with the primary objective of meeting certain earnings thresholds". His analysis concentrated on operational activities of managers to identify REM. Previous research found that Roychowdhury (2006) model possess an extensive explanatory success to detect REM (Cohen and Zarowin 2008; Cohen, Dey and Lys 2008). Graham et al. (2005) and Bruns & Merchant (1990) conducted a survey where they discover top financial executives love to manipulate income through REM activities rather than traditional accrual-based EM because management achieves extra flexibility in REMs compares to accrual EM. At any given time of the year, management can apply REMs whereas accruals management techniques are conversant to be applied only at the closing day of the year. REM involves alteration or manipulation concerning real activities of the firms to fulfill some target of management at a cost of firm's resources. More importantly, consistent with the evidence provided by (Graham et al. 2005), (Cohen, Dey and Lys, 2008) document that management switched their choice from accrual management to REM in the Post Sarbanes–Oxley Act (SOX) period. Our study will use REM model (Roychowdhury 2006) to detect REM. In this study, we also use exploits REM model to detect EM in our study.

Audit quality and earnings management

Audit quality will be ensured, when the external auditor detect irregularity or fraud in financial reporting and unveils it to the different users of the financial statements (DeAngelo 1981). Auditors are responsible to give an opinion on the client's financial reports. Although, different stakeholder believe that auditors can influence the management to report quality earnings. Legal framework of the country also influence earnings management. Strong legal framework of country is associated with less earnings management (Burgstahler & Eames 2003). Prior research argues that auditors may not involve in deterring management from earnings management and give audit report according to the demand of the clients, particularly if audit firms get high fees compare to its engagement hours (Reynolds and Francis 2000).

Lin & Hwang (2010) find auditor size, specialization and tenure are related with earnings management. On the other hand, Gul et al. 4wwz(2003) argue that audit fee and discretionary accrual are positively associated. DeAngelo (1981) treat this attitude of auditor as economic bonding. This economic bonding impairs the audit independence. Defond & Zhang, (2014) classify the audit quality proxies in two ways, output measures and input measures. Output measures includes restatement, going concern opinion, discretionary accrual, accrual quality, market reaction, meet/beat, cost of capital, conservatism, change in market share and regulatory inspection. On the other hand, big audit firms, industry specialization, audit fee and changes in fees are included in input measures.

Prior studies use different types of proxies to measure audit quality. Researchers do not reach to a general consensus on which one is best. Some of the measures have good strength, and they also suffer from important drawbacks. Advantage of input measures is not engage—such as, Big auditors and industry specialization are static characteristics of auditor Defond & Zhang (2014). This attributes are unique compare to going concern opinion proxy. Moreover, Big N proxy has a high construct validity because this proxy related with all other proxies. Within Big audit firms, quality difference can be calculated by considering strength of audit specialization. Due to that advantages, we are taking Big N auditor and industry specialization as a proxies for audit quality for our study. As well as, frequency of going concern report is rare in the context of Bangladesh and due to that this reduce the explanatory power in test. In this study, going concern proxy is not taken.

Big N membership is measured by auditor's size. Size of the audit firm are used as a proxy of audit quality (Chen et al. 2011). They classify the eight largest (top eight) audit firms as a good auditor who will provide better audit quality report compare to not-top auditors. Big N are competent to deliver high quality audit report because they have the capability to give higher quality input. Big audit firms have more ''in-house'' experience in dealing with the audit of public companies (Francis and Yu 2009). Becker (1993) state that important aspect of human capital is experience. Francis & Yu (2009) also argue that large office and more engagement of big audit firms provide opportunities its auditors to detect material misstatement of financial statement and that requires to correct the financial statement before issuance. Auditor of large firms got the opportunity of in-house consultation opportunity or networking.

DeAngelo (1981) raise the issue of incentives and competencies of the auditor to provide quality audit report, and also argue that larger audit firms more likely have more incentives and better competencies compare to smaller firms. Danos et al. (1989) argue that larger office are getting advantage to deliver higher quality audit report compare to small office. They mention that for any issue, auditors are more likely to consult with their peers within same office rather than with colleagues in the national office. Similarly, Francis et al. (1999) argue that auditors in big offices may

have more expertise to detect and deter aggressive earnings management activities of management. Inaam et al., (2012) and Soliman and Ragab (2014) documented that audit quality proxied by the size of the audit is negatively related with earnings management.

We may expect that clients in big audit firms will practice less in earnings management. So, we hypothesize the following:

H1: *Big 4 audit firms reduce real earnings management.*

Industry specialization of auditor is measured by client industry concentration, and specialist auditors more likely have better competency and greater reputation incentives to deliver good audit quality report (Jaggi, Leung and Gul, 2009; Sun et al. 2011; Defond and Zhang 2014). Auditor's industry specialization helps to identify the auditors differently from competitors in serving audit service. Chan et al. (2001) state that audit firms have to adjust with different characteristics of client and meet their demand. It makes them specialized in this respective industry. Recent evidence proposes that specialist auditors deliver better quality audit report compare to other auditors (O'Keefe, Simunic and Stein, 1994; Beasley and Petroni 2001). Similarly, Dunn & Mayhew, (2004) argue that industry specialist auditors help to enhance disclosure quality and at the same time engagement of specialist auditors give a signal to provide better quality report to the users. They also state that industry specialist auditor can help the client by sharing their expertise and knowledge. More specifically, prior study propose that industry expertise of auditors increase audit quality and enhance to increase reporting quality (Solomon, Shields and Whittington, 1999), influencing the choice of audit test and allocation of audit hours (Low 2004). Moreover, Zuo, L., & Guan (2014) found a negative relationship between audit specialization and earnings management in case of income decreasing situations. On the other hand, Minutti-Meza (2013) document that auditor's specialization is not a reliable indicator for audit quality. Similarly, Hegazy, M. A., Al Sabagh, A., & Hamdy (2015) argue that audit specialization is not associated with earnings management.

Industry specialist auditors able to identify misstatements of financial statement more effectively and easily by using their industry expertise. Chen et al. (2011) measure industry "specialization as the proportion of the sum of the square root of the total assets of clients that an auditor has to the sum of the square root of the total assets of all clients of the auditor in a particular" industry. They use 10 percent as a threshold for identifying industry specialization. Rusmin (2010) determine auditor industry specialization based on 20 percent threshold of the market share. On the other hand, Carcello et al. (2011) and Dunn & Mayhew (2004) define industry specialization on the basis of increasing market share. Market share measured by ratio of total sales audited by an audit firm to the total sales of this respective industry. Prior to the consolidation (Big Eight into the Big Six in 1989), if an audit firms audit more than 10 percent of firms, sales or fees are defined as a specialized audit firms(Defond et al. 1994a; Becker, C. L., DeFond, M. L., Jiambalvo, J., & Subramanyam 1998; Craswell et al.1995). After the consolidation, percentage has been increased to 16 percent. We are setting 10 percent threshold in case of Bangladesh for both revenue and asset. Our following hypotheses are:

H2: *Audit firm specialization (measured by asset value) is negatively associated with real earning management.*

H3: *Audit firm specialization (measured by audit revenue) is negatively associated with real earning management.*

We employ Models 1 to 3 to test the above mentioned hypotheses:

$$\mathrm{REM}_{it} = \alpha_0 + \alpha_1 \mathrm{BIG4} + \alpha_2 \mathrm{CONT} + \Sigma \mathrm{IndustryYearFixedEffect} + \varepsilon_{it} \quad (1)$$

$$\mathrm{REM}_{it} = \alpha_0 + \alpha_1 \mathrm{AUDITSA} + \alpha_2 \mathrm{CONT} + \Sigma \mathrm{IndustryYearFixedEffect} + \varepsilon_{it} \quad (2)$$

$$\mathrm{REM}_{it} = \alpha_0 + \alpha_1 \mathrm{AUDITSR} + \alpha_2 \mathrm{CONT} + \Sigma \mathrm{IndustryYearFixedEffect} + \varepsilon_{it} \quad (3)$$

where REM_{it} is real earnings management, measured by management's real activities for firms *i* at time *t*. AUDITSA stands for audit firm specialization (measured by asset value). AUDITSR is audit firm specialization (measured by revenue value), CONT depicts control variables, and ε_{it} is the usual error term. Similar to Razzaque et al. (2016), our study have been estimated via a two-dimensional fixed effects on industry year basis to account for the overlooked group level heterogeneity.

Research methodology

Data and methodology

From 2000 to 2005, there was no CG guidelines for Bangladesh public listed companies to follow. In 2006, BSEC

Table 1 By year Sample of firm-years, by year and industry

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Total
Number of listed firms	102	105	103	115	115	116	116	117	123	123	130	141	148	153	167	167	145	118	2304
annual reports are not available	10	8	9	6	7	7	6	7	7	6	5	6	5	4	5	4	4	3	109
Final sample	92	97	94	109	108	109	110	110	116	117	125	135	143	149	162	163	141	115	2195

issued voluntary CG guideline for all listed Bangladeshi firms. Again in 2012, BSEC issued revised CG guideline for listed firms (BSEC 2012). Our study inspects data ranging over an eighteen-year from 2000 to 2017, and sample size is 2195 firm years. Following previous research literature on REM, (Alves 2012; Roychowdhury 2006), our study excludes all financial companies from the sample. As an electronic database of public listed companies is not available in Bangladesh, we encoded data manually in our study. The main sources of data include company annual report, prospectus, different public issue offer documents and monthly review of Dhaka Stock Exchange. According to previous study, (Hsiao 2003), We utilize panel study for our analysis for of its exclusive capability to separate the properties of explicit treatments and actions both over across sections and time (Hsiao 2003), moreover it provides valid control over unobserved effects due to omitted variable bias. (Munnik and Schotman 1994). Tables 1 and 2 chart the number of observation conferring to each year and each industry, respectively.

Research design

Dependent variable: real earnings management

In addition to traditional accrual-based EM, lately, there has been a renewal of research interest to understand and document the procedure of firms to manipulate their reported income through real activities (see, Roychowdhury 2006). Moreover, Roychowdhury (2006) documents that firms apply manifold REM techniques to achieve predetermined earnings, and it is more flexible for manager to manipulate financial reporting. Similarly, Graham et al. (2005) take interview of top executives and provide evidence and recommending that top executives of corporate firms love REM procedures in comparison to the procedures of accrual-based EM. Since real management activities can be unsuspectingly vague, and undetectable from optimal business decisions that the costs induced under such processes is in no way economically insignificant to the firm. Cohen et al. (2008) investigate the pervasiveness of real earnings and accrual-based management in the period of pre- and post-SOX period on three different incentives for manipulating earnings. They found that following the passage of SOX REMs increased significantly, while accrual-based EM decline considerably. Consistent with Cohen et al. (2008) findings, (Graham et al. (2005) document those firms are switching from accrual-based management to REM, possibly because these will be costly as well as more difficult to detect.

Moreover, they document that 80% of Chief Financial Officers (CFOs) mentioned, they show a lower amount of research and development expenses to report a higher profit and 55% responded that they would be reluctant to initiate a

Table 2 By industry

industry	Engine-ering	Food	Fuel and Power	Jute	Tex-tile	Pharma-ceutical	Paper and Printing	Service and Real estate	Travel and leisure	Cem-ent	IT-Sector	Tann-ery	Cera-mic	Telecom-munica-tion	Miscellaneous	Total
Number of listed firms	366	296	166	51	476	340	19	48	30	99	87	84	67	14	161	2304
annual reports are not available	16	15	8	2	37	6	1	3	2	5	4	3	2	0	5	109
Final sample	350	281	158	49	439	334	18	45	28	94	83	81	65	14	156	2195

new project to meet earnings target. Similar to Roychowdhury's (2006) proxies, to measure real activities manipulations, we choose abnormal cash flows from the operation, production costs and discretionary expenses. Following Roychowdhury (2006), several studies examine the REM activities by employing the same proxies ((Zang 2007; Cohen, Dey and Lys, 2008; Gunny 2010; Razzaque, Ali and Mather, 2016) and increase the empirical utility of these proxies.

We apply three different methods and examine the influence on the three variables stated above:

1. Accelerating sales value through more lenient or increased price discount
2. Reducing cost of goods sold through increased production
3. Reporting lower discretionary expenses

We use Dechow et al. (1998) model as implemented by Roychowdhury (2006) to generate a normal level of operating cash (OCF), production cost and discretionary expenses.

Abnormal operating cash flows (A_OCF): By offering more sales discount and lenient credit period, firms can increase sales for a short period of time. These sales discount and lenient credit period will boost current year earnings, assuming that firms' gross margin ratio is positive. This extra sales revenue will not result into higher current year operating cash flows at the same proportion. Actual cash flows will be lower than normal level cash flows. Abnormal cash is measured as the divergence between actual cash flow from operation and normal level cash flows from operation. We measure normal OCF as a function of sales and change in sales and estimate normal level operating cash flow from operation by following a cross-sectional regression model. This model has been applied for industries and years individually.

$$\frac{OCF_{it}}{\text{Assets}_{i,t-1}} = a_1 \frac{1}{\text{Assets}_{i,t-1}} + a_2 \frac{\text{Sales}_{it}}{\text{Assets}_{i,t-1}} + a_3 \frac{\Delta\text{Sales}_{it}}{\text{Assets}_{i,t-1}} + \varepsilon_{it}$$

where: OCF_{it} = Cash flow from operation during the period for firms i and time t; Assets_t = t-th Year-end value of assets in total t; $Sales_t$ = sales value in total at period of t; and $\Delta Sales_t$ = variation in sales between $\text{Sales}_t - \text{Sales}_{t-1}$

Abnormal production cost (A_PROD): Producing more units, management can spread the fixed cost per unit, thus per unit cost can be reduced. As long as this reduction cannot be outweighed by incremental marginal cost per unit and holding, management can produce more unit and show the lower cost of goods sold. So, firms can report high operating

profit margin. Due to excess production, production cost will be unusually greater than the normal level of production cost. Difference between normal and actual level of production cost is abnormal production cost. We measure a normal level of production cost as a linear function of current year sales and previous two years sales. According to Roychowdhury (2006), normal production cost will be estimated through following cross-sectional regression.

$$\frac{Proc_{it}}{Assets_{i,t-1}} = a_1 \frac{1}{Assets_{i,t-1}} + a_2 \frac{Sales_{it}}{Assets_{i,t-1}} + a_3 \frac{\Delta Sales_{it}}{Assets_{i,t-1}} + a_4 \frac{\Delta Sales_{it-1}}{Assets_{i,t-1}} + \varepsilon_{it}$$

where: $Proc_t$ = Production cost for the year t. We compute it by adding changes in inventory with the cost of goods sold. All other variables are explained and defined previously.

Abnormal discretionary expenses (A_DIS): In order to boost current year earnings, firms may report lower discretionary expenses, which includes selling and administrative expense, research and development expenses, and advertising expenses, in order to boost current year earnings. Hence, firms are reporting an abnormally lower level of discretionary expenses than the actual discretionary expenses. Abnormal discretionary expenses are the difference between normal discretionary expenses and actual discretionary expenses. As a linear function of sales, we measure normal level discretionary expenses. According to Roychowdhury (2006), following cross-sectional regression will estimate a normal discretionary expenses.

$$\frac{Disex_{it}}{Assets_{i,t-1}} = a_1 \frac{1}{Assets_{i,t-1}} + a_2 \frac{Sales_{it}}{Assets_{i,t-1}} + \varepsilon_{it}$$

when we measure discretionary expenses using current year sales, it may exert a significant effect on residual of the equation. To measure, this study deploys previous year sales to measure discretionary expense.

$$\frac{Disex_{it}}{Assets_{i,t-1}} = a_1 \frac{1}{Assets_{i,t-1}} + a_2 \frac{Sales_{i,t-1}}{Assets_{i,t-1}} + \varepsilon_{it}$$

where:$Disex_t$ = discretionary expense for the period of t. Combined value of research and development, advertising, and selling and administrative expenses are considered to measure discretionary expenses. Other variables are defined as in the previous setting. To control for heteroscedasticity, all pertinent variables are scaled by prior year asset ($Assets_{it-1}$) in all three previous equations.

The abnormal OCF, abnormal discretionary expenses and abnormal production costs are measured as the difference between the normal levels predicted from the above equations and actual values. As proxies of REMs, we use these three variables in our study. For a specific level of sales, if a company wants to show a higher profit by REM, they will try to act upon one or all of these: lower cash from operation, and/or less discretionary expenses, and/or higher production cost. For the sake of simplicity, we multiply abnormal cash flow and discretionary expenses by negative one to reorganize all three variables in the same direction. A positive value indicates REM through lowering cash flow and discretionary expense and overproduction. In order to measure REM proxies (REM_PROXY), we are taking sum of the value of A_OCF, A_DIS and A_PROD. In a similar fashion to Cohen & Zarowin (2008), to observe the effect of the individual

Table 3 Descriptive statistics

Variable	N	Mean	S.D	Quantiles				
				Min	.25	Mdn	.75	Max
REM	2195	− 0.01	0.22	− 1.10	− 0.11	− 0.00	0.10	0.92
REM1	2195	0.00	0.11	− 0.51	− 0.05	0.00	0.06	0.39
REM2	2195	− 0.01	0.19	− 0.93	− 0.08	0.00	0.07	0.74
A_OCF	2195	0.00	0.09	− 0.26	− 0.04	− 0.04	0.04	0.28
A_DIS	2195	− 0.00	0.06	− 0.24	− 0.02	0.00	0.03	0.20
A_PROD	2195	− 0.01	0.16	− 0.70	− 0.05	0.00	0.05	0.55
B IG4	2195	0.29	0.45	0.00	0.14	0.28	0.45	1.00
AUDITSA	2195	0.35	0.48	0.00	0.19	0.34	0.51	1.00
AUDITSR	2195	0.38	0.48	0.00	0.18	0.37	0.53	1.00
ROA	2195	0.07	0.08	− 0.20	0.03	0.07	0.11	0.32
SIZE	2195	20.85	1.69	17.26	19.68	20.70	21.99	25.29
LEV	2195	0.57	0.39	0.04	0.36	0.54	0.72	3.10
GROW	2195	0.17	0.65	− 0.64	− 0.18	0.01	0.30	3.38
LOSS	2195	0.14	0.35	0.00	0.06	0.15	0.23	1.00

variable, we encounter the empirical procedures on the variables individually as well.

Independent variable

We plan to test the effect of audit quality on REM, and hence, audit quality is our independent variable. We have taken big4 audit firms and audit specialization (measured by asset and revenue value) as a representation of audit quality.

Control variable

This study considers several control variables as suggested by prior REMs and CG literature. Following existing literature, as control variables, we take account of LEV and LOSS to measure risk of bankruptcy (Dyreng, Hillegeist and Penalva 2011). Firms engage in extreme risk-taking mostly through increased leverage (Bhagat, S., Bolton, B., & Lu 2015). Thus, firms are taking more risk by borrowing more funds from outside sources. On the other hand, if a firms incurred loss in consecutive few years, there is a risk that firms may go for bankruptcy. This study also includes ROA, GROW and SIZE as a control variable in consistent with previous studies (Becker, Defond, & California 1998; Cohen & Zarowin 2008; Deng & Wang 2006; Roychowdhury 2006). LEV characterizes the proportion of total debts to total firms' asset, LOSS is used as a limited dependent variable encoded with one when the firm experienced a loss in the preceding year, zero otherwise., ROA proxies for the ratio of current-period net earnings to current-period total assets, GROW represents the current-period growth rate of sales, and SIZE states the natural log of total assets of the present period.

Result

Descriptive statistics

Table 3 reports descriptive statistics of all variable of this present analysis. On average, the sample firms have a negative REM. It indicates that Bangladeshi firms engage in manipulation through downwardly. On average, BIG4 audit firms conducted audit 29% of total sample firms during this study period. On the other hand, specialist (in terms total assets) auditors audited 35% of total assets of the sample firms and in terms of revenue, they audited 38% of the total revenue of the sample firms. So, it indicates that BIG4 audit firms have a significant market share in B angladesh audit market.

Table 4 Pearson correlation

Variable	REM	REM1	REM2	A_OCF	A_DIS	A_PROD	BIG4	AUDITSA	ADUITSR	SIZE	LEV	GROW	ROA	LOSS
REM	1.00													
REM1	0.70***	1.00												
REM2	0.92***	0.43***	1.00											
A_OCF	0.51***	0.82***	0.14***	1.00										
A_DIS	0.52***	0.64***	0.56***	0.08***	1.00									
A_PROD	0.87***	0.25***	0.94***	0.13***	0.25***	1.00								
BIG4	− 0.12***	− 0.13***	− 0.11***	− 0.07***	− 0.13***	− 0.08***	1.00							
AUDITSA	0.02	0.03	0.02	0.02	0.03	0.01	0.55***	1.00						
AUDITSR	− 0.21***	− 0.14***	− 0.23***	− 0.03	− 0.20***	− 0.18***	0.45	0.87***	1.00					
SIZE	− 0.01	− 0.00	− 0.02	0.00	− 0.01	− 0.02	0.30	0.17***	0.11***	1.00				
LEV	0.14***	0.14***	0.07***	0.18***	− 0.01	0.09***	− 0.02	0.01	− 0.01	− 0.13***	1.00			
GROW	0.02	− 0.03	0.04	− 0.03	− 0.02	0.05	0.05***	− 0.01	0.03	− 0.07***	0.08***	1.00		
ROA	− 0.22***	− 0.25***	− 0.14***	− 0.24***	− 0.12***	− 0.12***	0.30***	0.18***	− 0.01	0.19***	− 0.37***	0.04**	1.00	
LOSS	0.07***	0.12***	0.02	0.14**	0.02	0.02	− 0.10***	− 0.05**	− 0.05	− 0.19***	0.35***	− 0.05**	− 0.53***	1.00

*$p < 0.10$. **$p < 0.05$. ***$p < 0.01$

Table 5 Relation between Real Earnings Management and big 4 Audit Firms

VARIABLES	1	2	3
BIG4	− 0.061***		
	[− 4.77]		
AUDITSA		0.007	
		[0.69]	
AUDITSR			0.002
			[0.22]
GROW	− 0.007	− 0.005	− 0.005
	[− 0.57]	[− 0.45]	[− 0.47]
LEV	0.050***	0.046**	0.046**
	[2.69]	[2.44]	[2.45]
SIZE	0.007**	0.001	0.001
	[2.13]	[0.28]	[0.39]
ROA	− 0.625***	− 0.729***	− 0.722***
	[− 6.94]	[− 7.99]	[− 8.01]
LOSS	− 0.028*	− 0.035**	− 0.034**
	[− 1.81]	[− 2.24]	[− 2.22]
Constant	− 0.090	0.018	0.012
	[− 1.30]	[0.26]	[0.18]
"Industry year fixed effect"	Yes	Yes	Yes
"Observations"	2,190	2,190	2,190
"R-squared"	0.09	0.07	0.07
"Adj. R-squared"	0.07	0.06	0.06

***p < 0.01, **p < 0.05, *p < 0.10

Correlation matrix

Table 4 exhibits the correlation among different variables included in this analysis. We find a negative relationship of REMs proxies with B IG4 audit firms and specialized audit firms in terms of audited revenue, and this relationship is statistically significant ($p < 0.01$). On the other hand, a positive relationship exists between REMs proxies and specialized audit firms in terms of audited revenue. REMs proxies are negatively associated with ROA. Moreover, this study finds that REMs proxies are positively associated with other three control variables (LEV and LOSS).

Where REM is real earning management; A_OCF is the abnormal cash flows from operations; A_DIS is the abnormal discretionary expenses; A_PROD is the abnormal production costs; REM_1 is the aggregate of A_OCF and A_DIS; REM_2 is the aggregate of A_PROD and A_DIS; INSIDE is insider ownership; BIG4 is big four audit firm in Bangladesh; AUDITSA is specialized auditors in terms of assets that they audited; AUDITSR means the specialized auditor in terms of revenue that they audited; SIZE states the natural log of total assets of the present period; LEV stands for the ratio of current total debt to current total asset of time period; GROW represents the current-period growth rate of sales; ROA proxies for the ratio of current-period net earnings to current-period total assets; LOSS is used as a limited dependent variable encoded with one when the firm experienced a loss in the preceding year, zero otherwise.

Regression results

In the present study, we consider the 'big 4' audit firms of Bangladesh in column 1 of Table 5. We report a negative association with real earnings management. This result suggests that clients of big audit firms are less likely to be involved in earnings management. This particular result is also consistent with prior studies. Big audit firms are exhibiting their due diligence and utilizing their expertise which assists to refrain management from earnings management practices. Additionally, big audit firms are concern about their future reputation by committing to deliver high-quality service. Findings also shows that client of non-big audit firms are prone to engage in manipulative financial statements preparation. All of the individual measures of real earnings management are negatively associated with big audit firm's clients' pool. More specifically, clients of non-big audit firms are involved in earnings management through changing discretionary expenses and production cost. The control variables, LEV and SIZE are positively associated with real earnings management. On the other hand, ROA is negatively correlated with real earnings management.

Column-2 of Table 5 displays the association between industry-specialized auditor (in terms of audited assets) and real earnings management. We find no association between auditor's specialization and real earnings management. Several underlying justifications may be in effect with regards to these empirical counterparts. First, the market for audit services is Bangladesh that is very much competitive. Auditors face severe challenges to retain the customers, hence most of them are weary of embarrassing their respective clients. As a result, the auditors limit their own supply of transparent and accountable modes service delivery. The demand for retaining clients thus exert an undue "counter-compliance" on the audit firms by the latter's being tied up to excessive competition. Also to mentioned that, ROA and LOSS are negatively associated with real earnings management while LEV is positively related with real earnings management.

In our empirical study, we take audited asset value to measure specialization of the auditors. Table 5 viz. column-3 present relationship between audit specialization (in terms of audited revenue) and real earnings management. Similar to auditor specialization (in terms of audited assets), we find no association between audit specialization and real earnings management. Similar reason is also application in this regard also. Even the audit firm are more expert compare to other firms, they are not contributing to increase the quality of the audit. Also, the industrial composition of the economy

Table 6 Robustness Check

VARIABLES	REM		REM		REM		REM
Study period	2000–2011	2012–2017	2000–2011	2012–2017	2000–2011	2012–2017	
BIG4	− 0.066***	− 0.065**					
	[− 4.44]	[− 2.47]					
AUDITSA			− 0.005	0.019			
			[− 0.41]	[1.10]			
AUDITSR					− 0.014	0.022	
					[− 1.20]	[1.41]	
Dummy_CG							− 0.009
							[− 0.95]
GROW	− 0.014	0.002	− 0.013	0.005	− 0.013	0.006	0.007
	[− 0.89]	[0.12]	[− 0.88]	[0.34]	[− 0.89]	[0.37]	[0.86]
LEV	0.021	0.110***	0.019	0.096***	0.018	0.096***	0.062***
	[0.89]	[4.29]	[0.80]	[3.75]	[0.79]	[3.78]	[3.38]
SIZE	0.011**	0.007	0.003	0.002	0.003	0.003	− 0.002
	[2.50]	[1.38]	[0.63]	[0.44]	[0.66]	[0.55]	[− 0.55]
ROA	− 0.710***	− 0.524***	− 0.796***	− 0.671***	− 0.791***	− 0.667***	− 0.702***
	[− 5.35]	[− 4.46]	[− 5.92]	[− 5.69]	[− 5.99]	[−5.73]	[− 8.03]
LOSS	− 0.065***	0.034	− 0.070***	0.022	− 0.069***	0.024	− 0.036**
	[− 3.18]	[1.46]	[− 3.41]	[0.90]	[− 3.40]	[1.00]	[− 2.30]
Constant	− 0.124	− 0.165	0.015	− 0.053	0.015	− 0.066	0.109
	[− 1.47]	[− 1.41]	[0.18]	[− 0.46]	[0.18]	[− 0.59]	[1.52]
Observations	1.344	846	1.344	846	1.344	846	2.195
R-squared	0.08	0.12	0.07	0.11	0.07	0.12	0.08
Adj. R-squared	0.06	0.10	0.05	0.09	0.05	0.09	0.07

Robust t-statistics in brackets

***$p<0.01$, **$p<0.05$, *$p<0.10$

of Bangladesh may not be as 'specialized' by their respective structure so as to benefit from industry-specialized audit firms. Hence, too much specialization of audit firms may be in fact counterproductive in consideration to much more 'generalized' nature of the firms. The data confirm the fact that expert and specialized audit firms are not being able to contribute positively to ensure transparency and accountability. Among other control variables, ROA and LOSS are negatively associated with real earnings management, and LEV is positively related with real earning management.

Robustness of the results

To ensure the robustness of our results, we conduct several forms of sensitivity analysis. The first sensitivity analysis illustrates the effect of test variable on results in two different time periods. Attributes of external auditors are the external CG mechanism. BSEC issued revised CG guideline in 2012.

This code was mandatory for all listed firms to follow. Prior to that guideline, it had been optional. To check the robustness our result, we divide our sample into pre-compulsory CG (2000–2011) and post-compulsory CG (2012–2017). We test three regressions individually to check each audit quality effect on REMs in two different sample periods. Sub-sample data have been used to test the relationships. Table 6 reports a negative association between BIG4 audit firms and REMs in both of the periods. BIG4 audit firms are negatively related with REMs, before compulsory CG ($p<0.1$) and during compulsory CG ($p<0.05$). AUDITSA is also negatively associated with REMs during 2000–2011 and positively associated during 2011–2017 under study. But, their association is not statistically significant. We can reproduce the similar findings in both the time frame for AUDITSR and REMs. So, this table shows that CG governance are not playing any significant role to restrain management from real earnings management practices.

For the second robustness test, we use a dummy variable for CG (Dummy_CG). This dummy variable encoded with one if the data are taken from 2012 to 2017, zero otherwise. Table 6 reports the sign of relevant coefficients. It indicates that due to revised CG, the magnitude of REM has been decreased but this is not statistically significant. Regulators

and auditors should emphasize more on financial reports of the listed firms, in particular for the firms which has been audited by non-BIG4 audit firms. Third, we eliminate all the outliers from our test and control variable. A winsorizing procedure has been used to exclude all extreme variables from our study. All the observation, which are more than three standard deviations away from mean, is replaced by exactly three standard deviation value.

Conclusion

In this study, we test the association between audit quality and REM of Bangladeshi firms listed on the Dhaka Stock Exchange throughout the period of 2000–2017. We get negative and statistically significant association between big4 audit firms and REM, which is consistent with Becker, C. L., DeFond, M. L., Jiambalvo, J., & Subramanyam (1998) and Rusmin (2010) who argue that when a firm has been audited by big4 audit firms, management of the audited firms are less likely to involve in real earnings management. This finding indicates that Bangladeshi listed firms which are audited by big4 audit firms are less likely to be involved in REM. On the other hand, no empirical association exists between audit specialization and REM. We see that the findings depict the nature of competition among the Bangladesh audit market. Auditors have significant incentives not to annoy the procedural structure of their clients. Hence, the audit-firms may be engaging in self-limiting their own scope of operations. The impact of CG on REM has also been tested. We find some level of positive impact of CG on REM but this is not statistically significant. So, internal control systems and audit committees tend to impact the monitoring functions of the external auditors via existent channels of influence.

Limitations of the study

This present study delivers its sole focus on the real earnings management behavior as exhibited by non-financial firms. As a consequence, this partial approach necessarily limits the scope of extension of the empirical findings toward all firms in operation in the capital market arena. In addition, it would be interesting to observe the counterfactual specifications of applying the 'discretionary accrual' approach in a similar backdrop of hypotheses setting which would have further corroborated the findings with more substantial confirmation. Also, whereas our work reports the firm-level implications of real earnings management behavior, it would be conceptually motivating to uncover the market-level efficiency and welfare implications of engaging in similar practices across varying time-horizons. We hope that future research in these directions will yield a greater understanding of the issues in context.

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