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How audit effort affects audit quality: An audit process and audit output perspective

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ABSTRACT

Using a unique dataset of audit days in China from 2006 to 2011, this paper examines the relationship between audit effort and audit quality from the perspective of audit process and audit output. The results show that audit effort significantly increases the probability of audit adjustments, which inhibits positive earnings management and improves the quality of audited financial statements. We also find that audit effort does not have a significant effect on the issuance of modified audit opinions overall, but that a modified audit opinion is more likely to be issued in the absence of an audit adjustment. Furthermore, we find that the impact of audit effort on audit quality is attenuated when clients are more complex and when audit firms are larger. Collectively, our evidence suggests that audit effort plays an important role in improving audit quality by influencing audit process and audit output. Our study extends the literature on the impact of audit effort on audit quality in emerging markets, and the conclusions have important implications for the improvement of China's audit market efficiency.

1. Introduction

Audit plays an important role as an external corporate governance mechanism, and the governance effect of audit is directly reflected in audit quality. The overall objectives of audit are to obtain reasonable assurance that there is no material misstatement caused by fraud or error in financial statements, and to issue audit reports in accordance with auditing standards and communicate with client management (MOF, 2019).[1]

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[1] For details, please refer to the standard on auditing revised and implemented by the Ministry of Finance (MOF) in 2019: *China Certified Public Accountants Standard on Auditing No.1101: Overall Objectives of the Certified Public Accountants and the Basic Requirements for the Conduct of an Audit* (MOF [2019] No. 5).

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To realize these objectives, in the modern risk-oriented audit model, the main line of audit work requires auditors to identify, evaluate and respond to the risk of material misstatement. Consistent with the audit objective, audit quality is defined as the joint probability that an existing material misstatement is detected and reported by an auditor (DeAngelo, 1981). The realization process of audit quality can be summarized as detecting, adjusting, and reporting material misstatements, and achieving audit quality. How to realize audit objectives and improve audit quality has always been the focus of audit research.

Prior studies primarily investigate factors influencing audit quality from the perspective of auditor independence, including client importance, audit firm tenure, auditor mandatory rotation, and fees from audit and non-audit services (Reynolds and Francis, 2000; Frankel et al., 2002; Kinney et al., 2004; Carey and Simnett, 2006; Chen and Xia, 2006; Lennox et al., 2014; Zhang et al., 2017). Another stream of literature studies other characteristics of auditors and audit firms, such as auditor demographic characteristics and audit firm size and reputation (Qi et al., 2004; Liu and Zhou, 2007; Zhang and Fu, 2008; Cheng et al., 2009; Fang, 2011; Gul et al., 2013; Wang et al., 2015; Gong et al., 2016; He et al., 2018). Audit is regarded as a process of information searching, processing, judging, and adjusting (Gibbins, 1984). Audit effort is also a vital factor impacting audit quality, as hard work is necessary in carrying out a successful audit. However, due to the unavailability of large datasets on audit effort, evidence of the relationship between audit effort and audit quality is scarce. Many prior studies are based on experimental methods or use indirect indicators (e.g. audit fees) to measure audit effort (Bonner and Sprinkle, 2002; Gul, 2006; Knechel et al., 2009; Yang and Zhang, 2010). Different from such studies, this paper uses a unique dataset of audit days as a direct proxy of audit effort to extend the audit literature.

Using a unique database of audit days in China from 2006 to 2011, this paper investigates the impact of audit effort on audit quality from the perspective of audit process and audit output. We find that audit effort significantly increases the probability of audit adjustments (especially downward audit adjustments), which inhibits earnings management by clients (mainly the inhibition of positive earnings management) and improves the quality of audited financial statements. Consistent with the findings of a higher probability of audit adjustments and higher-quality audited financial statements, we also find that audit effort does not significantly affect the issuance of modified audit opinions overall, but a modified audit opinion is more likely to be issued in the absence of an audit adjustment. Furthermore, we find that the impact of audit effort on audit quality is attenuated when clients are more complex and when audit firms are larger. Collectively, our evidence suggests that audit effort has a significant role in improving audit quality. Our conclusions hold when we control for endogeneity problems.

Our study makes two main contributions. First, we extend the audit literature that examines the economic consequences of audit effort in emerging markets. Prior studies generally use experimental methods or indirect indicators (e.g. audit fees) to measure audit effort (Bonner and Sprinkle, 2002; Gul, 2006; Knechel et al., 2009; Yang and Zhang, 2010). However, audit fees are influenced not only by audit costs, but also by audit risk.[2] To the best of our knowledge, only Caramanis and Lennox (2008) examine the relationship between audit effort and earnings management by clients; they use data for Greece, a developed market. Different from prior studies, this paper comprehensively examines the impact of audit effort on audit quality from the perspective of audit process and audit output based on a unique database on audit days in China, a typical and important emerging market.

Second, our study contributes to the literature on the realization mechanism of audit quality. This paper describes unobservable auditor behavior throughout the audit process and the realization of audit objectives with observable measures, including audit adjustments, audit opinions, and the quality of audited financial statements. We find that audit effort promotes auditors' detection and adjustment of misstatements, as well as reporting material misstatements, which improves the quality of audited financial statements and thus provides evidence on the realization mechanism of audit quality. Our findings have some implications for the improvement of audit market efficiency in China and suggest that auditors should invest sufficient audit

[2] The literature using audit fees as proxy for audit effort has not reached a consistent conclusion. For example, Lobo and Zhao (2013) found a significant positive correlation between audit effort and audit quality, while Hribar et al. (2014) found a significant negative correlation. These contrary conclusions may be the result of ineffective measures of audit effort.

resources to improve audit quality, so as to promote the development of the economy through high-quality audits.

2. Literature review and hypothesis development

2.1. Literature review

Audit quality is defined as the joint probability that an existing material misstatement is detected and reported by an auditor (DeAngelo, 1981), and is generally considered to be determined by the auditor's independence and competency (DeFond and Zhang, 2014). One line of the literature studies the factors affecting auditor independence, such as client importance, audit firm tenure, auditor mandatory rotation, and fees from audit and non-audit services (Reynolds and Francis, 2000; Frankel et al., 2002; Kinney et al.,2004; Carey and Simnett, 2006; Chen and Xia, 2006; Lennox et al., 2014; Zhang et al., 2017). Another line of research studies the characteristics of auditors and audit firms, such as auditor demographic characteristics (Cheng et al., 2009; Gul et al., 2013; He et al., 2018), characteristics of auditor experience (Zhang and Fu, 2008; Fang, 2011; Wang et al., 2015), audit firm size and reputation (Qi et al., 2004; Liu and Zhou, 2007), and the efficiency improvement associated with audit firm mergers (Gong et al., 2016). Prior studies on audit quality mainly focus on audit output measured by audit opinions or accounting quality. However, we still know little about the audit process, especially how it affects the realization of audit quality. This paper investigates the realization mechanism of audit quality from the perspective of audit process and audit output, and thus contributes to the growing literature on the determinants of audit quality.

Audit effort not only affects the probability that auditors will detect an existing material misstatement but also plays an important role in the communication between the auditor and client management. However, there is little academic evidence regarding the impact of audit effort on audit quality; this is attributed to a lack of datasets on audit effort. Dye (1993, 1995) and Hillegeist (1999) suggest that theoretically, hard-working auditors are more likely to detect overstated earnings. The experimental work of Bonner and Sprinkle (2002) indicates that monetary incentives for audit effort have a positive effect on audit performance. Lobo and Zhao (2013) and Hribar et al. (2014) use audit fees as a proxy for audit effort to study the impact on audit quality, but they come to contrary conclusions. Caramanis and Lennox (2008) use a unique database of audit hours in Greece between 1994 and 2002 and find that abnormal accruals are positive more often than negative when audit hours are lower. Gong et al. (2016) utilize audit firm mergers in China and find a significant reduction of audit effort arising from audit market consolidation, but they focus on the factors impacting audit effort rather than the effect of audit effort on audit quality. To summarize, evidence on the economic consequences of audit effort is generally based on mature audit markets in developed markets; China, a typical and important emerging market, has received relatively little attention, which provides a good opportunity for our study.

2.2. Hypothesis development

In practice, audit is regarded as a process of information searching, processing, judging and adjusting (Gibbins, 1984). A complete audit process generally includes accepting business entrustment, planning audit work, identifying, evaluating and responding to material misstatement risk, and preparing audit reports. The overall audit objectives are to obtain reasonable assurance that there is no material misstatement caused by fraud or error in financial statements, and to issue audit reports in accordance with auditing standards and communicate with client management (MOF, 2019). To realize these objectives, in the modern risk-oriented audit model, the main line of audit work requires auditors to identify, evaluate and respond to the risk of material misstatement. In audit practice, auditors collect audit evidence through the implementation of audit procedures to detect material misstatements in financial statements. When auditors detect material misstatements, they either communicate with the management of the client to adjust the detected misstatements (i.e. audit adjustment), or they reflect the unadjusted material misstatements in the form of modified audit opinion. Thus, the process of realizing audit quality can be summarized as detecting, adjusting, and reporting material misstatements and achieving audit quality. If we convert the

above conceptual-level audit stages into specific audit variables, they can be made to correspond to the audit adjustment, the audit opinion, and the quality of audited financial statements. In the realization process of audit quality, hard work is necessary for auditors to carry out a successful audit. Dye (1993, 1995) and Hillegeist (1999) also suggest that hard-working auditors are theoretically more likely to detect overstated earnings. Therefore, audit effort is a vital factor that affects audit quality. Accordingly, the impact of audit effort on audit quality can be divided into three aspects: audit adjustment, audit opinion, and the quality of audited financial statements.

First is the impact of audit effort on the occurrence of audit adjustments. An adjustment occurs when two conditions are met: (1) there is a misstatement in the pre-audit financial statements and (2) the auditor detects the misstatement and requires client management to correct it through an adjustment to the financial statements (Lennox et al., 2014). If management approves the identification, judgment, and adjusting requirements, the detected misstatement will be corrected through an audit adjustment. However, if management does not approve and refuses to correct the detected problems, two outcomes may result: (1) the auditor may agree with management's justification of the detected misstatement and waive the proposed audit adjustment, or (2) management and the auditor may be unable to reach an agreement. If the auditor does not accept management's justification of the misstatement and management refuses to accept a proposed audit adjustment, the auditor may respond by issuing a modified audit opinion.

Accordingly, the impact of audit effort on audit adjustments may be reflected in two ways. Audit adjustments may occur more frequently when audit effort is greater, for three reasons. First, with an increase in audit effort, auditors can implement more comprehensive audit procedures and obtain more appropriate and sufficient audit evidence, thus improving the probability that they will detect misstatements. Second, with more appropriate and sufficient audit evidence, the detected misstatements are more likely to have a significant impact on the reasonableness and fairness of the financial statements, so auditors will be less likely to waive proposed audit adjustments. Third, the increase in audit effort may mean that auditors can communicate more effectively with client management and persuade them to correct the detected misstatements through adjustments. However, audit effort may have no effect on audit adjustments, for two reasons. First, although audit effort may increase the probability of auditors detecting existing misstatements, if management does not approve of auditors' judgments and refuses to accept the proposed adjustments, auditors may respond by issuing a modified audit opinion. Second, given the marginal diminishing of audit returns (Caramanis and Lennox, 2008), if the material misstatement risk of pre-audit financial statements is already low or if audit effort for a client is already high, the marginal impact of additional audit effort on adjustments may be not significant. Therefore, we propose the following null hypothesis:

H1. Audit effort has no effect on the occurrence of audit adjustments.

Second is the impact of audit effort on audit opinions. The audit opinion reflects prudence of auditors regarding audit risk. Theoretically, when auditors find no noteworthy violations or misstatement in a company's financial information, they issue an unqualified audit opinion; otherwise, they issue a modified audit opinion. However, because of the inherent limitation of the audit, it is impossible to eliminate audit risk. For example, the auditor may not fully understand the operation and management of the client given limited costs and time, leading to an inaccurate evaluation of material misstatement risk or a failure to identify material misstatements. The auditor may then improperly issue an unqualified audit opinion. Accordingly, the impact of audit effort on audit opinions may result in two outcomes. On the one hand, when audit effort is greater, the auditor could understand the client more deeply, make more accurate assessments of the material misstatement risk, and detect material misstatements. Thus, the auditor will be more likely to issue a modified audit opinion with increased audit effort. On the other hand, greater audit effort may mean deeper communication between the auditor and client management and more detected misstatements, which may lead to a modified audit opinion that could have been corrected through audit adjustments. The auditor would then no longer need to issue a modified audit opinion. To summarize, higher audit effort does not necessarily lead to more frequent issuance of modified audit opinions and could even lead to less frequent issuance, which is related to whether client management accepts the proposed audit adjustments. Therefore, we form the following null hypothesis:

H2. Audit effort has no effect on the issuance of modified audit opinions.

Third is the impact of audit effort on the quality of audited financial statements. In audit practice, auditors obtain reasonable assurance that financial statements are free from material misstatements by implementing a series of audit procedures, which requires a certain amount of audit resources. Therefore, the impact of audit effort on the quality of audited financial statements may be reflected in two outcomes. First, audit effort improves the quality of audited financial statements by increasing the likelihood that auditors will detect, adjust, and report material misstatements. Second, given the marginal diminishing of audit returns (Caramanis and Lennox, 2008), if the quality of pre-audit financial statements or audit effort for a client is already high, the marginal effect of additional audit effort may be not significant. Thus, we propose the following null hypothesis:

H3. Audit effort has no effect on the quality of audited financial statements.

3. Data and methodology

3.1. Sample selection

We obtain proprietary datasets on audit effort and audit adjustments from China's Ministry of Finance (MOF),[3] and we obtain other company-level data from the China Stock Market and Accounting Research (CSMAR) database. We use the following process to refine our sample: (1) we exclude companies in the financial industry; (2) we exclude company-year observations with negative equity; (3) we exclude company-year observations with more than 365 audit days; and (4) we eliminate company-year observations with incomplete financial data. Finally, we obtain 7833 company-year observations over the 6-year period of 2006–2011.

Table 1 presents the sample breakdown by year (Panel A) and industry (Panel B). As Panel A shows, the sample shows an increasing trend and basically keeps pace with the total number of listed companies in China. As Panel B shows, the industry distribution is similar to the overall distribution of listed companies, indicating that our sample has good representativeness.

3.2. Definitions of main variables

It has always been difficult to measure audit effort because of a lack of data. Studies generally use experimental methods or indirect indicators (e.g. audit fees) to measure audit effort (Bonner and Sprinkle, 2002; Gul, 2006; Knechel et al., 2009; Yang and Zhang, 2010). In contrast, we use the aggregate days worked on an audit project by all audit team members obtained from the MOF as the proxy for audit effort. Specifically, we measure audit effort (*EFFORT*) as the natural logarithm of aggregate audit days (=audit days × number of audit team members), which directly reflects the total working time of an audit team on an audit project (Caramanis and Lennox, 2008; Gong et al., 2016).[4]

Following Lennox et al. (2014) and He et al. (2018), we construct the dummy variable *ADJUST* to capture the occurrence of audit adjustments. Specifically, *ADJUST* equals 1 if there is an audit adjustment to company *i* profits in year *t*, and 0 otherwise. We construct the dummy variable *MAO* to capture the issuance of modified audit opinions. Specifically, *MAO* equals 1 if company *i* receives a modified audit opinion in year *t*, and 0 otherwise. Finally, we measure the quality of audited financial statements with the absolute value of discretionary accruals (*DA_ABS*), which are the residuals from the modified Jones model of performance adjustment (Kothari et al., 2005):

[3] From 2006 to 2011, audit firms in China were required to report their clients' pre-audit earnings privately to the MOF (Lennox et al., 2014; He et al., 2018). Therefore, our final sample period is from 2006 to 2011.

[4] On an audit project, the signing CPA is mainly responsible for the audit report. He et al. (2019) suggest that the audit days mainly reflect the audit effort of the signing CPA. Therefore, we also use the natural logarithm of audit days to measure the signing CPAs' effort, and our results are robust.

Table 1
Sample distribution.

Panel A: By year

Year	2006	2007	2008	2009	2010	2011	Total
N	953	1178	1325	1378	1444	1555	7833
%	12.17%	15.04%	16.92%	17.59%	18.43%	19.85%	100.0%

Panel B: By industry

Industry	n	%	Industry	n	%
Agriculture	88	1.12%	Energy and Water	385	4.92%
Mining	208	2.66%	Construction	171	2.18%
Food and Beverage	357	4.56%	Transportation	307	3.92%
Textile, Apparel, Fur, and Leather	263	3.36%	IT and Computing	455	5.81%
Paper and Printing	124	1.58%	Wholesale and Retail Trade	567	7.24%
Petroleum, Chemical, Plastics, and Rubber	823	10.51%	Real Estate	600	7.66%
Electronics	383	4.89%	Public Utilities	167	2.13%
Metal and Non-metal	706	9.01%	Entertainment	55	0.70%
Machinery, Equipment, and Instruments	1318	16.83%	Conglomerates	242	3.09%
Medicine and Biological Products	568	7.25%			
Other Manufacturing	46	0.59%	Total	7833	100.0%

$$\frac{TA_{i,t}}{A_{i,t-1}} = \alpha_1 \frac{1}{A_{i,t-1}} + \alpha_2 \frac{\Delta REV_{i,t} - \Delta REC_{i,t}}{A_{i,t-1}} + \alpha_3 \frac{PPE_{i,t}}{A_{i,t-1}} + \alpha_4 ROA_{i,t-1} + \varepsilon_{i,t} \tag{1}$$

where TA is the total accruals, which is equal to the net profits minus the net cash flows from operating activities, A is the lagged total assets, ΔREV and ΔREC are the changes in sales and accounts receivable, respectively, PPE is the original value of property, plant and equipment, and ROA is the return on total assets. We estimate Eq. (1) for each industry-year that has at least 10 observations, and the residual of Eq. (1) is the discretionary accrual. We then use the absolute value of discretionary accruals (DA_ABS) to measure the quality of audited financial statements. A smaller DA_ABS means higher audited financial quality.

3.3. Model specification

Following He et al. (2018) and Lennox et al. (2018), we test H1-H3 by estimating the following models:

$$ADJUST = \alpha_0 + \alpha_1 EFFORT + \gamma \sum CONTROLS + \varepsilon \tag{2}$$

$$MAO = \beta_0 + \beta_1 EFFORT + \lambda \sum CONTROLS + \varepsilon \tag{3}$$

$$DA\_ABS = \theta_0 + \theta_1 EFFORT + \kappa \sum CONTROLS + \varepsilon \tag{4}$$

where Eqs. (2) and (3) are estimated using a logit model and Eq. (4) is estimated using a tobit model. The dependent variables $ADJUST$, MAO, and DA_ABS are proxies for the auditors' detecting and adjusting misstatements, reporting material misstatements, and achieving audit quality, respectively. The variable of interest, $EFFORT$, measures audit effort. Following the literature, we include two sets of control variables. The first set captures client characteristics: we control for $SIZE$, equal to the natural logarithm of total assets; LEV, equal to the total liabilities divided by the total assets; BM, equal to the book-to-market ratio; AGE, equal to the natural logarithm of the company's age; SOE, equal to 1 for stated-owned enterprises, and 0 otherwise; ROA, equal to audited profits divided by total assets; $BOARD$, equal to the natural logarithm of the number of directors on the board; $INDDIR$, equal to the percentage of independent directors on the board; $CASH$, equal to cash and cash equivalents divided by total assets; REC, equal to accounts receivable divided by total assets; INV, equal to inventory divided by total assets; RPT, equal to related-party transactions divided by sales; and $SUBS$, equal to the natural logarithm of the number of consolidated subsidiaries. The second set of control variables captures audit firm characteristics, including $SWITCH$, equal to 1 if company i hires a new audit firm in year t, and 0 otherwise; $TENURE$, equal to the consecutive years the incumbent audit firm has audited the company; BIG_AUDIT, equal to 1 for international Big 4 or Chinese domestic Big 10 audit

firms, and 0 otherwise; *MA_AUDIT*, equal to 1 if the incumbent audit firm merges with another audit firm in year *t*; *MROT_FINAL*, equal to 1 if the engagement partner is in the final year of tenure in year *t* because the partner is scheduled for mandatory rotation at the end of the audit, and 0 otherwise; and *MROT_FIRST*, equal to 1 if the engagement partner is in the first year of tenure in year *t* due to mandatory rotation of the former partner at the end of year $t-1$, and 0 otherwise. We also include industry and year fixed effects in all the regressions. We cluster standard errors by client given multiple yearly observations for each client (Petersen, 2009).

4. Main results

4.1. Summary statistics

Table 2 presents the summary statistics for the main variables. All of the continuous variables are winsorized at the top and bottom 1 percent to mitigate the influence of extreme values. The mean of *ADJUST* is 0.663, indicating that 66.3% of the observations in our sample had audit adjustments, which is similar to the findings of Lennox et al. (2014) and He et al. (2018). The mean of *MAO* is 0.055, indicating that 5.5% of the observations received a modified audit opinion. The mean (median) of *DA_ABS* is 0.075 (0.049). The mean (median) of *EFFORT* is 5.571 (5.541), which is similar to the findings of Gong et al. (2016).[5] The distribution of the other variables is similar to those in prior Chinese studies.

4.2. Regression results

Table 3 reports the regression results of estimating Eq. (2). The coefficient on *EFFORT* in column (1) is positive and significant at the 1% level (0.1596 with z-stat. = 5.03), indicating that audit adjustments occur more frequently with increased audit effort. That may be because an increase in audit effort results in auditors detecting more material misstatements and communicating more effectively with client management. Given the mean value of the control variables, when *EFFORT* rises from the first quantile to the third quantile, the predicted audit adjustment probability increases by 5.19%, which is similar to the result in He et al. (2018). Thus, the impact of audit effort on audit adjustments is both economically and statistically significant. In addition, the behavior of the control variables is consistent with that in prior studies. For example, audit adjustments occur less often for larger companies, older companies, companies audited by Big 10 audit firms, and state-owned-enterprises. Audit adjustments occur more often when the incumbent audit firm has a longer tenure or engages in an M&A transaction, or during the departing partner's final year of tenure prior to mandatory rotation.

Considering the different impacts of audit adjustments on profits in different directions, we further investigate the different effects of audit effort on upward and downward adjustments. Auditors' reputations are damaged if their clients are found to have overstated earnings, but there is generally no penalty when clients understate earnings (St. Pierre and Anderson, 1984; Kellogg, 1984; Caramanis and Lennox, 2008). Consistent with the asymmetric loss functions faced by auditors, they tend to disagree with client management on accounting choices that increase earnings rather than those that decrease earnings, and they require management to adjust earnings downward (DeFond and Jiambalvo, 1993; Kinney and Marti, 1994; Nelson et al., 2002). Therefore, we predict that the effect of audit effort on downward audit adjustments will be more significant than that on upward adjustments. Following Lennox et al. (2014), we construct a trichotomous variable (*ADJ_SGN*) that equals 2 when there is a net downward adjustment, 1 when there is a net upward adjustment, and 0 when there is no adjustment. Columns (2) and (3) of Table 3 present the results for a multinomial logit model with the no-adjustment observations as the benchmark. Consistent with the prediction, we find a more significant coefficient on *EFFORT* in column (2) than in column (3) (z-stat. = 5.32, 1.94), which indicates that auditors require more downward adjustments than upward adjustments as audit effort increases.

[5] We note that the mean (median) of *EFFORT* is 7.017 (7.155) in Gong et al. (2016), who use audit hours instead of audit days to measure audit effort. Assuming that auditors work 8 h a day, our measure of audit effort should differ from theirs by Ln (8) or 2.08.

Table 2
Summary statistics.

Variables	Mean	Std.	25%	Median	75%
ADJUST	0.663	0.473	0.000	1.000	1.000
MAO	0.055	0.227	0.000	0.000	0.000
DA_ABS	0.075	0.086	0.022	0.049	0.094
EFFORT	5.571	1.141	4.787	5.541	6.269
SIZE	21.70	1.231	20.86	21.59	22.41
LEV	0.519	0.233	0.364	0.518	0.654
BM	0.937	0.823	0.397	0.683	1.193
AGE	1.989	0.778	1.609	2.303	2.565
SOE	0.612	0.487	0.000	1.000	1.000
ROA	0.052	0.066	0.028	0.050	0.080
BOARD	2.201	0.200	2.197	2.197	2.303
INDDIR	0.363	0.050	0.333	0.333	0.375
CASH	0.155	0.120	0.070	0.124	0.206
REC	0.091	0.089	0.021	0.0660	0.137
INV	0.181	0.159	0.072	0.143	0.232
RPT	0.867	2.493	0.090	0.329	0.774
SUBS	2.088	0.930	1.386	2.079	2.708
SWITCH	0.092	0.289	0.000	0.000	0.000
TENURE	5.793	3.271	3.000	6.000	8.000
BIG_AUDIT	0.463	0.499	0.000	0.000	1.000
MA_AUDIT	0.152	0.359	0.000	0.000	0.000
MROT_FINAL	0.061	0.240	0.000	0.000	0.000
MROT_FIRST	0.055	0.228	0.000	0.000	0.000

This result also suggests that audit effort may restrain overly optimistic earnings or upward earnings management behavior by management.

Table 4 reports the regression results of the estimation of Eq. (3).[6] The coefficient on *EFFORT* in column (1) is positive but not significant for the full sample, indicating that audit effort does not have a significant effect on the issuance of a modified audit opinion overall. This result also coincides with the finding in Table 3. With increased audit effort, client management accepts adequate adjustments to correct detected misstatements and thus avoids a modified audit opinion. It is noteworthy that companies in China may prefer receiving a modified audit opinion to accepting audit adjustments under certain circumstances because of explicit requirements by the China Securities Regulatory Commission (CSRC) regarding target profitability levels (Chen et al., 2001; He et al., 2012). For example, since 2000, companies are given "special treatment" (ST) status if they report two consecutive years of losses, and ST companies are delisted if they report a loss in a third consecutive year. In addition, companies seeking to raise equity must maintain a certain minimum return on equity for three consecutive years. Because of these institutional features in China, the expected cost of receiving a modified audit opinion may be lower than that of accepting audit adjustments that hurt profits (Chen et al., 2001). We conjecture that audit effort may promote the issuance of modified audit opinions in the absence of audit adjustment.

To test this conjecture, we divide the full sample into two subsamples according to whether there is an audit adjustment, and we test the effect of audit effort on modified audit opinions using two subsamples. Columns (2) and (3) of Table 4 present the results. We find an insignificant coefficient on *EFFORT* for the subsample with audit adjustments in column (2) and a significant positive coefficient on *EFFORT* for the subsample with no audit adjustment in column (3),[7] indicating that when material misstatements have been corrected through audit adjustment, audit effort does not have a significant effect on the issuance of an modified audit opinion. However, if client management rejects the proposed adjustments, auditors will respond by issuing a modified

[6] The number of observations is slightly reduced in this analysis compared with Table 3 because the value of *MAO* is all zero for some industries.

[7] This subsample consists of two cases: (1) when there is no material misstatement in pre-audit financial statements and no adjustment is needed, and (2) when a proposed adjustment is declined by management. Our prediction holds for the second case. However, we cannot empirically separate these two cases.

Table 3
Audit effort and audit adjustment.

Dependent variable: *ADJUST*/*ADJ_SGN*	(1) *ADJUST*	(2) *ADJ_SGN* = 1	(3) *ADJ_SGN* = 2
EFFORT	**0.1596*** **	**0.1802*** **	**0.0723***
	(5.03)	**(5.32)**	**(1.94)**
SIZE	−0.2648***	−0.3083***	−0.1312**
	(−5.49)	(−6.04)	(−2.47)
LEV	−0.2655	−0.0234	−0.0594*
	(−1.26)	(−1.17)	(−1.68)
BM	−0.0147	0.0105	−0.1428**
	(−0.27)	(0.20)	(−2.16)
AGE	−0.1007*	−0.1703***	0.0166
	(−1.65)	(−2.70)	(0.24)
SOE	−0.3356***	−0.3835***	−0.2524**
	(−3.70)	(−4.08)	(−2.41)
ROA	0.4664	−0.2996	1.0187**
	(0.83)	(−0.83)	(1.98)
BOARD	−0.1450	−0.0826	−0.3204
	(−0.68)	(−0.38)	(−1.33)
INDDIR	0.0431	−0.1695	0.0107
	(0.06)	(−0.24)	(0.01)
CASH	−0.3349	−0.4026	0.2993
	(−0.97)	(−1.38)	(1.53)
REC	0.3501	0.3292	0.3418
	(0.68)	(0.61)	(0.56)
INV	−0.5011	−0.5395	−0.5515
	(−1.52)	(−1.63)	(−1.44)
RPT	−0.0006	−0.0316	−0.1302**
	(−0.05)	(−0.63)	(−2.16)
SUBS	−0.0134	0.0114	−0.0487
	(−0.27)	(0.20)	(−0.77)
SWITCH	0.0066	0.0796	−0.1278
	(0.07)	(0.77)	(−1.02)
TENURE	0.0897***	0.1026***	0.0684***
	(6.03)	(6.57)	(4.02)
BIG_AUDIT	−0.3694***	−0.3700***	−0.3599***
	(−4.61)	(−4.44)	(−3.89)
MA_AUDIT	0.4240***	0.3996***	0.4742***
	(4.67)	(4.23)	(4.44)
MROT_FINAL	0.1816*	0.2203*	0.0904
	(1.70)	(1.91)	(0.66)
MROT_FIRST	0.1036	0.0548	0.1956
	(0.92)	(0.46)	(1.40)
Constant	6.5202***	7.0185***	2.8243**
	(6.02)	(6.13)	(2.18)
Industry fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
N	7833		7833
Pseudo-R^2	0.0711		0.0551
Wald Chi^2	415.92		7935.64
Prob. > Chi^2	0.0000		0.0000

Notes: Column (1) presents the result of a logit model, and columns (2) and (3) present the results of a multinomial logit model. The *z*-statistics shown in parentheses are adjusted for clustering by client. ***, **, and * denote significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

Table 4
Audit Effort and Audit Opinion.

Dependent variable: *MAO*	(1) Full sample	(2) *ADJUST* = 1	(3) *ADJUST* = 0
EFFORT	**0.0142**	**−0.0633**	**0.2285***
	(0.16)	**(−0.69)**	**(1.75)**
SIZE	−0.8758***	−0.9058***	−1.3902***
	(−5.62)	(−7.23)	(−7.50)
LEV	4.1611***	5.5509***	5.6941***
	(8.81)	(8.69)	(5.92)
BM	0.2356	0.0796	0.5320***
	(1.54)	(0.51)	(2.97)
AGE	0.6715***	0.4950***	1.0556***
	(3.19)	(2.86)	(3.71)
SOE	−0.1124	−0.1150	−0.7671***
	(−0.51)	(−0.63)	(−2.61)
ROA	−7.6927***	−8.0118***	−8.0704***
	(−8.67)	(−8.55)	(−5.49)
BOARD	0.6147	0.7708	1.0060
	(0.95)	(1.20)	(1.12)
INDDIR	3.5559*	3.9946*	0.0341
	(1.86)	(1.76)	(0.01)
CASH	−1.5731	−4.0246***	−1.3405
	(−1.36)	(−3.98)	(−0.98)
REC	0.2171	−0.5425	0.2675
	(0.20)	(−0.58)	(0.17)
INV	−3.3477***	−2.5412***	−2.8060**
	(−3.67)	(−3.86)	(−2.49)
RPT	0.0431**	−0.0132	−0.0010
	(2.26)	(−0.27)	(−0.01)
SUBS	−0.0472	0.0481	−0.0206
	(−0.34)	(0.38)	(−0.10)
SWITCH	0.0274	0.1495	−0.0774
	(0.12)	(0.50)	(−0.21)
TENURE	−0.0647*	−0.0115	−0.1551***
	(−1.92)	(−0.38)	(−3.09)
BIG_AUDIT	0.1187	0.0040	−0.2855
	(0.66)	(0.02)	(−0.65)
MA_AUDIT	0.3257*	0.3466*	−0.3188
	(1.86)	(1.94)	(−1.19)
MROT_FINAL	−0.2018	−0.4500	0.3037
	(−0.60)	(−1.00)	(0.43)
MROT_FIRST	−0.2644	−0.5660	−0.2561
	(−0.75)	(−1.31)	(−0.30)
Constant	11.4577***	10.3938***	22.2490***
	(3.47)	(3.53)	(5.25)
Industry fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
N	7550	4655	2088
Pseudo-R^2	0.4282	0.3847	0.4438
Wald Chi^2	556.03	460.70	210.73
Prob. > Chi^2	0.0000	0.0000	0.0000

Notes: The *z*-statistics shown in parentheses are adjusted for clustering by client. ***, **, and * denote significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

audit opinion. Given the mean value of the control variables, when *EFFORT* increases from the first quantile to the third quantile, the predicted modified audit opinion probability increases by 0.62%, which is economically significant.

Table 5 reports the regression results of the estimation of Eq. (4).[8] The coefficient on *EFFORT* in column (1) is negative and significant at the 1% level (−0.0034 with *t*-stat. = −3.16), indicating that the absolute value of discretionary accruals decreases significantly as audit effort increases. Given the mean value of the control variables, when *EFFORT* increases from the first quantile to the third quantile, the predicted absolute value of discretionary accruals decreases by 6.72%.

Considering the different impacts of discretionary accruals on profits in different directions, we further investigate the different effects of audit effort on positive and negative discretionary accruals. Auditors' reputations are damaged if their clients are found to have overstated earnings, but there is generally no penalty when clients understate earnings (St. Pierre and Anderson, 1984; Kellogg, 1984). The results in Table 3 also show that the effect of audit effort on downward audit adjustments is more significant than that on upward adjustments. Therefore, we predict that the effect of audit effort on positive discretionary accruals will be more significant than that on negative discretionary accruals. To test this prediction, we divide the full sample into two subsamples according to the sign of the discretionary accruals, *DA_POS* and *DA_NEG*. We then test the effects of audit effort on *DA_POS* and *DA_NEG*. Columns (2) and (3) of Table 5 present the results. Consistent with our prediction, we find a significant and negative coefficient on *EFFORT* when the dependent variable is *DA_POS*, as shown in column (2), and an insignificant coefficient on *EFFORT* when the dependent variable is *DA_NEG*, as shown in column (3), indicating that the positive discretionary accruals are significantly inhibited as audit effort increases but that the negative discretionary accruals are not sensitive to audit effort. In other words, auditors pay more attention to positive discretionary accruals than to negative discretionary accruals. It is worth noting that these results are consistent with the findings in Table 3. From the perspective of audit process, an increase in audit effort mainly promotes downward audit adjustments. Correspondingly, from the perspective of audit output, increased audit effort mainly restrains positive discretionary accruals.

To strengthen the logic of this paper, we divide the full sample into two subsamples according to whether there is an audit adjustment, and we test the effect of audit effort on the absolute value of discretionary accruals using two subsamples. Columns (4) and (5) of Table 5 present the results. We find a significantly negative coefficient on *EFFORT* for the subsample with audit adjustments in column (4) and an insignificant coefficient on *EFFORT* for the subsample with no audit adjustment in column (5), which indicates that the inhibitory effect of audit effort on discretionary accruals only exists when there is an audit adjustment. These results further support that audit effort improves the quality of audited financial statements and that this effect is mainly achieved through audit adjustments.

4.3. Endogeneity issue

Audit effort is endogenous. It may be determined by clients' characteristics, including client size, business complexity, and operation risk. However, it may be also determined by auditors' characteristics, such as audit firm size, audit firm tenure, and mandatory rotation of audit partners. In addition, audit effort may be persistent over time, making the previous year's audit effort closely associated with the current year's audit effort (Caramanis and Lennox, 2008). To address the endogeneity issue, we estimate the abnormal audit effort according to the ideas of abnormal accruals and abnormal audit fees. We estimate a model of audit effort as follows:

$$EFFORT = \varphi_0 + \varphi_1 LagEFFORT + \phi \sum CONTROLS + \varepsilon \tag{5}$$

[8] To understand the economic implications more intuitively, we also use an ordinary least squares (OLS) model, and all our results are robust.

Table 5
Audit Effort and the Quality of Audited Financial Statements.

Dependent variable: *DA_ABS*	(1) *DA_ABS*	(2) *DA_POS*	(3) *DA_NEG*	(4) *ADJUST* = 1	(5) *ADJUST* = 0
EFFORT	**−0.0034*** **	**−0.0032*** **	**0.0011**	**−0.0040*** **	**0.0002**
	(−3.16)	**(−3.03)**	**(1.10)**	**(−3.06)**	**(0.12)**
SIZE	0.0018	0.0026	0.0012	0.0025	0.0002
	(1.12)	(1.59)	(0.92)	(1.29)	(0.08)
LEV	0.1079***	0.0275***	−0.0742***	0.1139***	0.1022***
	(10.14)	(3.61)	(−12.96)	(7.67)	(7.00)
BM	−0.0216***	−0.0059**	0.0093***	−0.0198***	−0.0130***
	(−8.38)	(−2.50)	(5.60)	(−6.93)	(−4.82)
AGE	−0.0004	−0.0032*	−0.0074***	0.0008	0.0012
	(−0.19)	(−1.65)	(−4.42)	(0.32)	(0.39)
SOE	−0.0120***	−0.0078***	0.0075***	−0.0132***	−0.0142***
	(−4.74)	(−3.13)	(3.21)	(−4.58)	(−2.92)
ROA	0.1507***	0.3565***	0.1518***	0.0091	0.0666
	(4.74)	(13.02)	(7.40)	(0.26)	(1.31)
BOARD	−0.0272***	−0.0090	0.0186***	−0.0245***	−0.0173*
	(−4.02)	(−1.62)	(3.04)	(−3.58)	(−1.78)
INDDIR	0.0354	0.0223	0.0203	0.0529*	−0.0572
	(1.15)	(1.01)	(1.00)	(1.82)	(−1.47)
CASH	0.0050**	−0.0141	−0.1194***	0.0653***	0.0930***
	(2.28)	(−1.25)	(−11.23)	(4.44)	(4.17)
REC	−0.0318**	0.0380**	0.0475***	−0.0138	−0.0345
	(−1.99)	(2.32)	(3.53)	(−0.67)	(−1.30)
INV	0.0488***	0.0891***	−0.0074	0.0417***	0.0896***
	(3.68)	(8.54)	(−0.69)	(2.77)	(4.61)
RPT	−0.0000	0.0016***	0.0002	0.0010*	0.0013
	(−1.43)	(2.71)	(0.81)	(1.71)	(1.54)
SUBS	−0.0049***	−0.0030**	0.0026**	−0.0048***	−0.0037
	(−3.08)	(−2.14)	(1.99)	(−2.67)	(−1.59)
SWITCH	0.0134***	0.0060	−0.0072*	0.0069	0.0194***
	(3.12)	(1.63)	(−1.91)	(1.27)	(2.82)
TENURE	−0.0008*	−0.0007	0.0003	−0.0011*	−0.0009
	(−1.69)	(−1.49)	(0.79)	(−1.89)	(−1.13)
BIG_AUDIT	−0.0001	0.0010	0.0006	−0.0018	0.0025
	(−0.04)	(0.37)	(0.22)	(−0.59)	(0.46)
MA_AUDIT	−0.0069***	−0.0078***	0.0034*	−0.0033	−0.0121***
	(−3.10)	(−3.59)	(1.66)	(−1.24)	(−3.00)
MROT_FINAL	−0.0067*	−0.0056	0.0034	−0.0050	−0.0124*
	(−1.73)	(−1.41)	(0.93)	(−1.07)	(−1.83)
MROT_FIRST	0.0032	0.0034	0.0008	0.0019	0.0071
	(0.81)	(0.78)	(0.20)	(0.41)	(0.89)
Constant	0.0798**	0.0173	−0.1130***	0.0540	0.0526
	(2.15)	(0.50)	(−3.33)	(1.24)	(1.14)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
N	7833	4122	3711	5197	2636
Pseudo-R^2	−0.0955	−0.0999	−0.1025	−0.0856	−0.1117
F	43.09	18.78	63.25	8.77	234.62
Prob. > F	0.0000	0.0000	0.0000	0.0000	0.0000

Notes: The *t*-statistics shown in parentheses are adjusted for clustering by client. ***, **, and * denote significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

The dependent variable *EFFORT* measures the current year's audit effort. One of the determinants of the current year's audit effort is the previous year's audit effort (*LagEFFORT*). The other determinants are the same as the control variables in Eq. (2). We estimate Eq. (5) for each industry-year, and the residual of

Table 6
Abnormal audit effort as the independent variable.

	(1) *ADJUST*	(2) *MAO*	(3) *DA_ABS*
Ab_EFFORT	**0.1588*****	**−0.0006**	−0.0004**
	(3.19)	**(−0.00)**	(−1.99)
Controls	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
N	6771	6335	6784
Pseudo-R^2	0.0690	0.4232	−0.0434
Wald Chi^2/F	309.85	528.94	30.32
Prob. > Chi^2/F	0.0000	0.0000	0.0000

Notes: Columns (1) and (2) present the results for the logit model, and column (3) presents the results for the tobit model. The *z*-statistics/*t*-statistics shown in parentheses are adjusted for clustering by client. ***, **, and * denote significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

Eq. (5) is the abnormal audit effort (*Ab_EFFORT*).[9] Next, we replace the independent variable *EFFORT* with *Ab_EFFORT* in Eq. (2)–(4). Table 6 reports the regression results. Our inferences are unchanged when we repeat the analysis with abnormal audit effort.

Although we have regarded the company's decision to hire an audit firm as exogenous, in reality, the company could choose an audit firm to serve their own interests (Chen and Zhou, 2006). This raises another possible endogeneity issue, self-selection, because a company may choose a lower-quality audit firm if it intends to manipulate earnings. In this case, lower audit effort is associated with lower probability of audit adjustments and higher discretionary accruals. We argue that endogeneity is more likely to be a problem when audit firm tenure is short, and it is reasonable to regard the audit firm choice as exogenous when audit firm tenure is long.[10] If our findings are mainly driven by endogenous audit firm choice, the results should disappear or be much weaker in a long-tenure subsample.

Based on the above analysis, we estimate Eqs. (2)–(4) after partitioning the sample by the median of audit firm tenure (i.e., 6 years). Table 7 reports the regression results. We find that the coefficients on *EFFORT* are both significant at least at the 5% significance level in the two subsamples when the dependent variable is *ADJUST* or *DA_ABS*. We also find that the coefficients on *EFFORT* are both insignificant when the dependent variable is *MAO*. Overall, these results indicate that our findings do not appear to be driven by the endogeneity of audit firm choice.

4.4. Other robustness tests

We perform a battery of additional tests to ascertain the robustness of our findings. First, we include client fixed effects to alleviate the potential impact of other unobservable factors that do not vary with time at the client level. Panel A of Table 8 presents the regression results, and we find that the results hold when controlling client fixed effects. Second, we use the magnitude of audit adjustments (*ADJ_MAG*) as an alternative measure of audit adjustments. Specifically, we use the absolute value of the difference between pre-audit and audited earnings divided by the absolute value of pre-audit earnings (i.e., $|E_{PRE}\text{-}E_{AUD}|/|E_{PRE}|$) and then take the natural logarithm as the measure of adjustment magnitude. Column (1) in Panel B of Table 8 shows that the coefficient on *EFFORT* is positive and significant at the 1% level, indicating that increased audit effort not only improves the frequency of audit adjustments but also increases the magnitude of audit adjustments.

[9] Untabulated results show that the mean (median) of the adjusted R^2 of the model (5) is 0.4371 (0.4478), the standard deviation is 0.3285, and the first and third quantiles are 0.2733 and 0.6119, respectively. Overall, the estimation model of abnormal audit effort fits well.

[10] For example, suppose that two companies, C1 and C2, were audited by the same low-quality audit firm A in 2005. Company C1 initially hired audit firm A in 2000, while company C2 initially hired the same audit firm A in 2005. We argue that company C2 is more likely to hire audit firm A due to its motivation of earnings manipulation. The audit firm choice of company C1 is less likely to be an endogeneity issue because of the longer lag between the audit firm's hiring choice and the motivation of earnings manipulation.

Table 7
Impact of audit firm tenure.

Panel A: Long-tenure subsample

	(1) *ADJUST*	(2) *MAO*	(3) *DA_ABS*
EFFORT	**0.2234*****	**−0.1726**	**−0.0021****
	(4.74)	**(−1.46)**	**(−2.02)**
Controls	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
N	3604	3439	3636
Pseudo-R^2	0.0683	0.4060	−0.0557
Wald Chi^2/F	189.24	319.89	215.66
Prob. > Chi^2/F	0.0000	0.0000	0.0000

Panel B: Short-tenure subsample

	(1) *ADJUST*	(2) *MAO*	(3) *DA_ABS*
EFFORT	**0.1094*****	**0.1324**	**−0.0031*****
	(2.60)	**(1.07)**	**(−3.22)**
Controls	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
N	4196	4197	4197
Pseudo-R^2	0.0837	0.4692	−0.0777
Wald Chi^2/F	494.60	378.63	29.66
Prob. > Chi^2/F	0.0000	0.0000	0.0000

Notes: Columns (1) and (2) present the results for the logit model, and column (3) presents the results for the tobit model. The *z*-statistics/*t*-statistics shown in parentheses are adjusted for clustering by client. ***, **, and * denote significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

Finally, we examine whether the results are robust to alternative measures of the quality of audited financial statements. Following Gong et al. (2016), we use the probability of a restatement to proxy for the quality of audited financial statements. Specifically, the dummy variable *MISSTATEMENT* equals 1 if the audited financial statements of a firm-year observation are misstated and the earnings are restated downward, and 0 otherwise (Guan et al., 2016). In addition, we use clients' accounting conservatism to proxy for the quality of audited financial statements. Following Khan and Watts (2009), we construct the firm-year level accounting conservatism index *C_SCORE*. A larger *C_SCORE* reflects greater accounting conservatism and higher-quality audited financial statements. Columns (2) and (3) in Panel B of Table 8 report the corresponding regression results. We find that the coefficients on *EFFORT* are significant at the 5% and 1% levels, indicating that increased audit effort reduces the probability of financial statement restatement and improves clients' accounting conservatism. These results provide further evidence that the quality of audited financial statements improves as audit effort increases.

5. Additional analyses

5.1. The impact of client characteristics

The previous section examines the relationship between audit effort and audit adjustment, audit opinion, and the quality of audited financial statements. However, the above relationship may be affected by the complexity and risk of the client. Auditors may have expectations regarding the difficulty and risk of the audit work and may therefore improve their work efficiency during the audit process for complex clients to reduce

Table 8
Other robustness tests.

Panel A: Controlling client fixed effects

	(1) *ADJUST*	(2) *MAO*	(3) *DA_ABS*
EFFORT	**0.2005*****	**0.0441**	**−0.0024****
	(4.84)	**(0.35)**	**(−2.01)**
Controls	Yes	Yes	Yes
Client fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
N	4571	853	7833
Pseudo-R^2	0.0401	0.3469	0.0468
Wald Chi^2/F	129.75	93.13	6.81
Prob. > Chi^2/F	0.0000	0.0000	0.0000

Panel B: Alternative measures of key variables

	(1) *ADJ_MAG*	(2) *MISSTATEMENT*	(3) *C_SCORE*
EFFORT	**0.0058*****	**−0.1336****	**0.0012*****
	(2.65)	**(−2.12)**	**(3.04)**
Controls	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
N	7833	7833	7833
Pseudo-R^2/Adj-R^2	0.1065	0.1163	0.5191
Wald Chi^2/F	18.17	244.55	149.91
Prob. > Chi^2/F	0.0000	0.0000	0.0000

Notes: The *z*-statistics/*t*-statistics shown in parentheses are adjusted for clustering by client. ***, **, and * denote significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

the audit risk to an acceptable level within the limited time. At the same time, because of the complexity of transactions, the quality of the pre-audit financial statements of such clients may be relatively low, which gives the auditors greater ability to promote the quality of financial statements through audit effort. We therefore expect audit effort to play a more significant role in improving audit quality when clients are more complex. However, it could be difficult for auditors to fully understand the operations of complex clients, to accurately assess the risk of material misstatements, and to detect potential misstatements. Therefore, under the same level of audit effort, the improvement in audit quality may be more limited in more complex clients. Moreover, auditors may make greater audit efforts with complex clients, and the diminishing returns could attenuate the effect of audit effort on audit quality. Thus, we would expect audit effort to play a less significant role in improving audit quality when clients are complex.

Following Pittman et al. (2019), we use client size (*SIZE*), the number of consolidated subsidiaries (*SUBS*), and the amounts of related party transactions divided by sales (*RPT*) as proxies for client complexity. Then, we partition the sample by the medians of *SIZE*, *SUBS*, and *RPT* and re-estimate Eqs. (2)–(4). Table 9 presents the regression results. Panel A of Table 9 shows that although the coefficients on *EFFORT* are significant for larger clients when the dependent variable is *ADJUST* or *DA_ABS*, the absolute values and significance of these coefficients are lower than those for smaller clients. Furthermore, we use the seemingly unrelated estimation (SUE) method to test the difference between the coefficients in the two subsamples. We find that the difference is significant at the 5% level, which provides support for the effects of audit effort on audit adjustments and indicates that the quality of audited financial statements is attenuated when clients are larger. Similarly, Panels B and C present the regression results of subsamples based on *SUBS* and *RPT*, respectively. We find that the effects of audit effort on audit adjustments and the quality of audited financial statements are less significant in clients with more subsidiaries and those with more related party transactions. In addition,

Table 9
Impact of client characteristics.

Panel A: By client size

	ADJUST		*MAO*		*DA_ABS*	
	(1) Larger	(2) Smaller	(3) Larger	(4) Smaller	(5) Larger	(6) Smaller
EFFORT	0.1322***	0.2601***	0.1592	−0.0586	−0.0016	−0.0053***
	(3.08)	(5.50)	(0.92)	(−0.51)	(−1.64)	(−3.24)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	3917	3916	3137	3716	3917	3916
Pseudo-R^2	0.0852	0.0567	0.3240	0.4719	−0.0642	−0.0793
Wald Chi^2/F	209.16	188.59	892.68	1052.84	65.83	18.06
Prob. > Chi^2/F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Test the difference in coefficients of EFFORT:						
Chi^2	4.06**		1.08		3.96**	
p-value	[0.0439]		[0.2919]		[0.0465]	

Panel B: By the number of consolidated subsidiaries

	ADJUST		*MAO*		*DA_ABS*	
	(1) More	(2) Fewer	(3) More	(4) Fewer	(5) More	(6) Fewer
EFFORT	0.1259***	0.2597***	0.0199	0.0087	−0.0017*	−0.0051***
	(3.20)	(4.82)	(0.17)	(0.06)	(−1.70)	(−2.84)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	4231	3602	3465	3340	4231	3602
Pseudo-R^2	0.0878	0.0633	0.4384	0.4640	−0.0660	−0.0771
Wald Chi^2/F	240.04	188.83	411.88	622.36	46.30	6.80
Prob. > Chi^2/F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Test the difference in coefficients of EFFORT:						
Chi^2	4.05**		0.00		2.96*	
p-value	[0.0441]		[0.9504]		[0.0851]	

Panel C: By the amounts of related party transactions

	ADJUST		*MAO*		*DA_ABS*	
	(1) More	(2) Fewer	(3) More	(4) Fewer	(5) More	(6) Fewer
EFFORT	0.1082**	0.2207***	0.1253	−0.0062	−0.0016*	−0.0046***
	(2.48)	(4.75)	(0.97)	(−0.05)	(−1.91)	(−3.03)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	3917	3916	3530	3548	3917	3916
Pseudo-R^2	0.0780	0.0470	0.4114	0.4628	−0.0531	−0.0934
Wald Chi^2/F	223.44	157.12	361.91	427.37	126.87	9.09
Prob. > Chi^2/F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Test the difference in coefficients of EFFORT:						
Chi^2	3.94**		0.58		3.07*	
p-value	[0.0473]		[0.4459]		[0.0795]	

Notes: Columns (1) to (4) present the results for the logit model, and columns (5) and (6) present the results for the tobit model. The *z*-statistics/*t*-statistics shown in parentheses are adjusted for clustering by client. ***, **, and * denote significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

the impact of audit effort on audit opinions is not significantly different from the overall client characteristics. In sum, these results indicate that the effect of audit effort on audit quality is attenuated when clients are more complex, which may be due to auditors' difficulty in detecting misstatements or to the more significant marginal diminishing of audit returns in more complex clients.

5.2. The impact of audit firm size

Next, we investigate whether the impact of audit effort on audit quality differs by audit firm size. The extent to which audit adjustments are adopted by management depends on the communication between the auditors and client management. During the communication process, auditors with higher independence are more likely to persuade management to accept the proposed adjustments. Numerous studies suggest that auditors in large audit firms have higher independence (Lennox and Pittman, 2010). In addition, large audit firms usually have more audit experience and more effective quality control systems; hence, the audit efficiency of large audit firms would be higher (Teoh and Wong, 1993). Therefore, we expect audit effort to play a more significant role in improving audit quality when audit firms are larger. However, the audit quality of large audit firms is already high, which gives the auditors less room to improve. Moreover, clients audited by large audit firms are usually more complex than those audited by small audit firms. Auditors in large audit firms may correspondingly increase their audit effort, but the diminishing returns could attenuate the effect of audit effort on audit quality (Caramanis and Lennox, 2008). Thus, we expect to observe that audit effort plays a less significant role in improving audit quality when audit firms are larger.

To test the above conjecture, we divide the sample into two subsamples according to audit firm size (i.e., *BIG_AUDIT*) and re-estimate Eqs. (2)–(4). Table 10 presents the regression results. We find that when the dependent variable is *ADJUST* or *DA_ABS*, the coefficients on *EFFORT* are lower in large audit firms than in small audit firms. The results indicate that the effects of audit effort on audit adjustments and the quality of audited financial statements are attenuated when audit firms are larger. In addition, the impact of audit effort on audit opinions is not significantly different for different audit firm sizes. In sum, the results indicate that the effect of audit effort on audit quality is attenuated when audit firms are larger, which may be due to auditors have less room to improve audit quality or to the more significant marginal diminishing audit returns in complex clients of large audit firms.

Table 10
Impact of audit firm size.

	ADJUST		*MAO*		*DA_ABS*	
	(1) Large	(2) Small	(3) Large	(4) Small	(5) Large	(6) Small
EFFORT	0.1299***	0.2590***	−0.0019	−0.0204	−0.0003	−0.0045***
	(2.78)	(5.79)	(−0.01)	(−0.19)	(−0.28)	(−2.95)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	3626	4207	3114	3981	3626	4207
Pseudo-R^2	0.1269	0.0333	0.4901	0.4213	−0.0607	−0.0835
Wald Chi^2/F	321.42	125.70	333.40	429.36	269.47	7.54
Prob. > Chi^2/F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Test the difference in coefficients of EFFORT:						
Chi^2	3.97**		0.01		5.03**	
p-value	[0.0463]		[0.9210]		[0.0249]	

Notes: Columns (1) to (4) present the result for the logit model, and columns (5) and (6) present the results for the tobit model. The *z*-statistics/*t*-statistics shown in parentheses are adjusted for clustering by client. ***, **, and * denote significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

6. Conclusions

Audit plays an important role as an external corporate governance mechanism, and the governance effect of audit is directly reflected in the quality of the audit. In this paper, we investigate the effect of audit effort on audit quality systematically from the perspective of audit process and audit output using a unique database of audit days in China from 2006 to 2011. We find that audit effort significantly increases the probability of audit adjustments (especially downward audit adjustments), which further inhibits the earnings management of clients (which is also mainly reflected in the inhibition of positive earnings management) and improves the quality of audited financial statements. Consistent with the findings of a higher probability of audit adjustments and higher quality audited financial statements, we also find that audit effort does not have a significant effect on the issuance of modified audit opinions overall, but that a modified audit opinion is more likely to be issued in the absence of an audit adjustment. Furthermore, we find that the effect of audit effort on audit quality is attenuated when clients are more complex and when audit firms are larger. Collectively, our evidence suggests that audit effort plays a significant role in improving audit quality.

Our study extends the literature that examines how audit effort affects audit quality in emerging markets. Our conclusions have some implications for improving audit market efficiency in China and suggest that regulators should pay attention to the audit effort of audit firms and encourage them to invest sufficient audit resources to improve audit quality and ensure the realization of audit objectives in order to promote the development of the economy through high-quality audits.

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