



Do Industry Specialist Audit Firms Influence Real Earnings Management? The Role of Auditor Independence

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ABSTRACT

In this study, we provide empirical evidence on how the relationship between industry specialist auditors and real earnings management (REM) is moderated by the auditors' independence. From a sample of Malaysian listed companies for the period 2009 to 2016, the results indicate that companies with specialist auditors are less likely to practise REM. However, this negative association is less pronounced when the independence of the specialist auditor is low, suggesting that the presence of economic bonding between the specialist auditor and the client may allow the auditor to become sufficiently lax to align with the interests of an economically important auditee. Our findings remain robust after controlling for endogeneity and self-selection bias and performing several further analyses. This study is the first to prove that auditor independence can moderate the effectiveness of industry specialist auditors in mitigating REM practices. The results have implications for policy makers to enhance the current regulation structure of auditing and accounting professions. The results also provide new insights into the association between audit quality, REM and auditor independence in an emerging economy.

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¿Influyen las firmas de auditoría especializadas en el sector en la gestión real de los beneficios? El papel de la independencia del auditor

RESUMEN

En este estudio proporcionamos evidencia empírica sobre cómo la relación entre los auditores especializados en la industria y la gestión de ganancias reales (REM) es moderada por la independencia de los auditores. A partir de una muestra de empresas malasias que cotizan en bolsa para el período comprendido entre 2009 y 2016, los resultados indican que las empresas con auditores especializados son menos propensas a practicar REM. Sin embargo, esta asociación negativa es menos pronunciada cuando la independencia del auditor especialista es baja, lo que sugiere que la presencia de vínculos económicos entre el auditor especialista y el cliente puede permitir que el auditor sea lo suficientemente laxo como para alinearse con los intereses de un auditado económicamente importante. Nuestros resultados siguen siendo sólidos tras controlar la endogeneidad y el sesgo de autoselección y realizar varios análisis adicionales. Este estudio es el primero que demuestra que la independencia de los auditores puede moderar la eficacia de los auditores especializados en el sector a la hora de mitigar las prácticas REM. Los resultados tienen implicaciones para que los responsables políticos mejoren la actual estructura de regulación de las profesiones de auditoría y contabilidad. Los resultados también aportan nuevos conocimientos sobre la asociación entre la calidad de la auditoría, el REM y la independencia del auditor en una economía emergente.

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1. Introduction

Many audit studies have reported that industry specialist auditors can provide high-quality services and therefore constrain earnings management practices. There are two substitute methods to manage earnings: real earnings management (REM) and accrual earnings management (AEM) (Cohen et al., 2008; Cohen & Zarowin, 2010; Roychowdhury, 2006). While research has extensively examined the relationship between audit quality and AEM (Balsam et al., 2003; Becker et al., 1998; Bratten et al., 2020; Francis et al., 1999; Gul et al., 2009; Jaggi et al., 2012; Jaggi et al., 2015; Lawrence et al., 2011; Reichelt & Wang, 2010), there is little research examining the relationship between audit quality and REM (Alhadab & Clacher, 2018; Burnett et al., 2012; Chi et al., 2011; Lopez & Vega, 2019). However, given the lack of studies on auditor industry specialization (Gaver & Utke, 2019), it is not known whether a specialist auditor as a high-quality provider is congruent with his/her quality when there is economic bonding between auditor and auditee. It is argued that strengthening this economic bonding by auditees paying excess fees may impair auditor independence, degrading audit quality (Simunic, 1984; Tepalagul & Lin, 2015). Thus, this study enriches the auditing and REM literature by examining whether the association between industry specialist auditors and REM could be moderated by auditor independence. Specifically, it aims to assess whether and how audit independence affects the effectiveness of the specialist auditor.

The research question has a three-fold motivation. First, although REM is increasingly common, few studies have investigated how specialist auditors influence auditees' use of REM. It is argued that, unlike AEM, REM is not subject to the scrutiny of the auditor since it involves decisions about daily operations (Burnett et al., 2012; Chi et al., 2011). Cohen et al. (2008) argue that managers might prefer REM to AEM, as the costs of managing real activities are lower and an auditor or regulator is less likely to identify it. Therefore, all these studies predict that specialist auditors could be related to higher levels of REM. However, a substantial increase in the literature on REM by accounting researchers could increase the concern of auditors, leading them to impose greater audit scrutiny on firms in relation to REM. This raising of auditors' awareness about REM may reduce its practice. Therefore, companies employing such specialist auditors as a critical indicator of audit quality may engage in fewer REM practices.

Second, industry specialist auditors, and therefore audit quality, can restrict the opportunities for managers to practise earnings management, whether REM or AEM. However, this influence may be limited by stronger economic bonds when the auditor relies financially on a specific auditee. According to economic theory, this economic bond may be created when the auditor derives a high percentage of fees from a particular auditee, making the auditor financially reliant on the auditee and therefore losing objectivity (DeAngelo, 1981). Conversely, the presence of a larger base of auditees makes the auditor more independent (DeAngelo, 1981). That is, if the independent judgement of an audit firm is affected by fee dependence, then its scrutiny may be reduced (Craswell et al., 2002). An important auditee could increase the industry specialist auditor's incentive to align with their interests, supporting them over controversial accounting issues (the auditor acts as an advocate for the auditee), which may influence the auditor's professional judgement. This alignment through excessive fees may incentivize the auditor to ignore

REM as a litigation or reputational threat, especially as it is difficult for regulators and shareholders to discover it. Thus, this study predicts that auditor independence may moderate the effect of industry specialist auditors on REM. This prediction may explain why the literature reports a positive association between industry specialist auditors and REM.

Third, our study responds to calls by researchers (e.g., Craswell et al., 2002; DeFond & Zhang, 2014) and regulators (i.e. Securities and Exchange Commission: SEC; Craswell et al., 2002) for research into auditor independence by exploring whether an economically important auditee might impair the independence of the audit firm.

This study focuses on Malaysia, for several reasons. First, Enomoto et al. (2015) examined the differences between AEM and REM across 38 countries over the period 1991-2010 by measuring investor rights and legal enforcement. Their results show that REM is preferred over AEM in countries with stronger investor protection, and that this is the case in Malaysia. According to the World Bank's Doing Business 2017 Report, Malaysia was positioned third for investor protection, supporting the results of Enomoto et al. (2015) study. Despite the rapid increase in the REM literature from accounting researchers, only a few have investigated REM in Malaysia; they include Abdul Rahman et al. (2018), Ghaleb et al. (2020), Ghaleb et al. (2021), Shayan-Nia et al. (2017) and Zamri et al. (2013), examining respectively the impact of Islamic ethical values, IAF investment in outside governance monitoring, ownership structure, and leverage on REM.

Second, unlike developed countries such as the US, UK and Germany which legislate to secure the financial independence of auditors (e.g., Sarbanes-Oxley Act (2002) (SOX) in the US, the Auditing Practices Board (APB) Ethical Standard 4 (Revised 2010) in the UK and the Commercial Code (Handelsgesetzbuch, HGB) in Germany)¹, Malaysia has done less to reform the regulatory structure of the audit profession in assessing and identifying circumstances that could adversely affect the objectivity and independence of auditors. Therefore, Malaysia is an appropriate choice to explore auditor independence.

Third, the cost of AEM relative to REM is higher when the regulatory environment becomes more stringent (Cohen et al., 2008). Unlike in the developed context (i.e. US & UK), the litigation risk to audit firms from errors in the statutory annual audited accounts from parties other than auditees is non-existent in Malaysia (Bliss et al., 2011). Meanwhile, auditors with no litigation concerns may reduce the quality of their audit services. An understanding of the role of specialist auditors in unique settings (e.g. with lower litigation risk) is important to advance our understanding of how auditors react to REM. For these reasons (i.e., REM is preferred over AEM, a less regulated structure in the audit profession, and non-litigation risk to audit firms), Malaysia provides unique institutional arrangements for us to examine the influence of specialist auditors on REM and how this relationship is influ-

¹Section 201(a) of SOX adds Section 10A(g) to the Securities Exchange Act of 1934. Section 10A(g) bans registered auditors from providing certain non-audit services to their auditees. According to the Auditing Practices Board (APB), Ethical Standard 4 (Revised December 2010, no. 31) "where it is expected that the total fees for both audit and non-audit services receivable from a listed audited entity and its subsidiaries audited by the audit firm will regularly exceed 10% of the annual fee income [...] the firm shall not act as the auditor of that entity and shall either resign as auditor or not stand for reappointment, as appropriate." In Germany, if the fees paid by a particular auditee to a public accounting firm over the last five years constitute more than 30% of the total revenues of that firm and it is expected that the audit firm will earn more than 30% in the current year, then the audit firm is not allowed to act as an auditor (German Commercial Code: Handelsgesetzbuch, HGB).

enced by auditor independence.

Using a sample of non-financial listed companies on Bursa Malaysia for the period 2009 to 2016, the results show that auditor industry expertise is related to lower levels of REM, suggesting that companies audited by specialist auditors practise less REM than those employing non-specialist auditors. Further, our findings indicate that audit firms with a high level of independence are more likely to mitigate REM, suggesting that when an auditee has greater weight in the audit firm's portfolio, this may compromise the independence of the audit firm and the quality of the audit provided. Thus, an auditor with less independence may have more incentive to support the client's preferences, becoming sufficiently lax to yield to pressure concerning REM activities. This study also finds that the effective role of an industry specialist audit firm in mitigating REM practices is affected by the extent of its independence. In particular, a specialist auditor with less independence is related positively with REM, suggesting that economic bonding between auditor and auditee may put pressure on the auditor to align with the interests of the economically important auditee. This result is consistent with economic theory prediction, that earning a high proportion of fees from a particular client can make the auditor financially reliant on the auditee, losing objectivity (DeAngelo, 1981). Our findings remain unchanged after controlling for endogeneity and self-selection bias and are robust to alternative measures of REM, specialist auditor, and auditor independence.

This study contributes to the growing literature on REM (e.g., Burnett et al., 2012; Chi et al., 2011; Lopez & Vega, 2019) which considers the role of the specialist auditor in REM; however, we re-examine this relationship by exploring whether it is affected by auditor independence. Further, our findings add to the literature on audit quality by illustrating that specialist auditors can constrain REM, although prior research provides evidence that industry specialization is positively associated with REM (Chi et al., 2011; Burnett et al., 2012; Lopez & Vega, 2019). Therefore, our paper provides supporting evidence for the prediction that specialist auditors provide high audit quality through their competence and reputation (DeFond & Zhang, 2014; Fargher et al., 2019). Our study also provides initial evidence for a positive association between auditor independence and REM. Finally, this paper contributes to REM and audit quality research by investigating this relationship in a unique setting (i.e. with lower litigation risk and in a less regulated context relating to the auditor's objectivity and independence). Thus, we fill this important gap in the literature.

Generally, our results have implications for studies using industry specialization as a proxy for audit quality (Chi et al., 2011; Burnett et al., 2012; Fargher et al., 2019; Lopez & Vega, 2019), which neglect to consider auditor independence as a contextual item in their research framework. They also have implications for policymakers regarding the specifics of audit quality and REM in Malaysia. The negative role of auditor independence in the relationship between audit quality and REM is consistent with the lower litigation risk and the lack of strict auditor independence regulations in Malaysia in comparison to the US, UK, and Germany, which is likely to influence the trust of current and potential investors in audit quality and the quality of financial reporting. Further, the results suggest directions for future researchers examining the relationship between audit quality and audit outcomes; they should consider the independence of auditors in this relationship.

The remainder of the paper is organized as follows. Sec-

tion 2 describes the audit profession in Malaysia. Section 3 reviews the literature and hypothesis development, and section 4 explains the research method. Section 5 presents the results and discussion, and section 6 provides the conclusion.

2. Audit profession in Malaysia

The auditing profession in Malaysia was influenced by the British presence, as from 1957 to 1970 auditors were seen as colonial agents (Tee, 2019) and economic and business activities tended to employ the British model. The development of the Malaysian accounting profession was also driven by the presence of the big international audit firms in monitoring the audit work and quality assurance procedures (Gul, 2006). To support the accounting and auditing professions, the Malaysian Association of Certified Public Accountants was established in 1958. The Companies Act of 1965 emphasized the importance of auditor independence and gave auditors the right to review reports, granting full access to all financial information (Ali et al., 2006). The Malaysian Institute of Accountants (MIA) is a semi-government agency established under the Accountants Act 1967 and is empowered by law to be an authoritative body which regulates the accounting profession. MIA's objective is to regulate and control local accounting practices to guarantee that only those who are qualified may be admitted to the profession and maintained on the register of accountants. Recently, MIA amended by-laws (On Professional Ethics, Conduct and Practice) to further emphasize auditor independence when performing audits, suggesting that auditor self-interest or intimidation would arise when the amount of audit fees from a client represented a large proportion of the auditor's total fees, thus questioning auditor independence (MIA, 2020).

The Securities Commission Malaysia (SCM) and Audit Oversight Board (AOB) also regulate the audit profession. The AOB was set up as an independent body to regulate the auditing of listed companies. A new accounting framework for Malaysian Financial Reporting Standards (MFRSs) was issued by the Malaysian Accounting Standards Board (MASB) on 19 November 2011. The MFRS became a fully International Financial Reporting Standards (IFRSs) complaint framework and equivalent to IFRSs. The new MFRS framework became effective on 1 January 2012. Thus, Malaysian companies with the new MFRS framework could issue their financial statements in compliance with the IFRSs.

3. Literature review and hypothesis development

3.1 Earnings management practices

Earnings management was defined by Healy & Wahlen (1999) as follows:

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 accounting numbers.

Based on this definition, managers exercise earnings management when they manipulate the reported earnings of companies in a manner that reflects inaccurate or unreal underlying economic performance; they can exercise earnings management through AEM (i.e. accounting decisions or accru-

als) and through REM by making or deferring expenditures (e.g., research and development, advertising, or maintenance). [Graham et al. \(2005\)](#) document that AEM and REM have long been recognized in the earnings management literature, with AEM initially to the fore ([Dechow et al., 1995](#); [DeFond & Jiambalvo, 1994](#); [Jones, 1991](#); [Kothari et al., 2005](#)), but more recently REM (e.g., [Chan et al., 2015](#); [Cohen et al., 2020](#); [Cohen et al., 2008](#); [Cohen & Zarowin, 2010](#); [Qi et al., 2018](#); [Roychowdhury, 2006](#); [Tahir et al., 2019](#)). [Cohen & Zarowin \(2010\)](#) argue that the costs of REM are likely to be greater than the costs of AEM because REM has a significant negative economic impact on firm value in the long run.

Managers may consider REM and AEM as two substitute strategies by weighting their respective costs and benefits ([Cohen & Zarowin, 2010](#); [Zang, 2012](#)). Therefore, the likelihood of companies engaging in REM could be higher when their ability to manage AEM is restricted. [Cohen et al. \(2008\)](#) provide an answer to the interesting question whether REM substituted or complemented AEM after the passage of the Sarbanes-Oxley Act (SOX), concluding that companies did switch from AEM to REM strategies post-SOX. Similarly, companies turned to REM as a substitute for AEM after the adoption of IFRS ([Ho et al., 2015](#)); if they are family companies ([Achleitner et al., 2014](#)); or if they are audited by higher-quality auditors ([Burnett et al., 2012](#); [Chi et al., 2011](#)). Thus, managers may prefer REM over AEM in the following circumstances: passage of SOX, IFRS adoption, tighter accounting standards, family companies, and stringent audit quality.

Despite the current extensive body of literature on REM, there is to date little research on how industry specialist and auditor independence affect REM. [Burnett et al. \(2012\)](#) and [Chi et al. \(2011\)](#) document that companies with higher-quality auditors resort to REM rather than AEM, suggesting that a higher-quality auditor might constrain the opportunities of managers to practise AEM. They conclude that the likelihood of engaging REM is greater when the company has an industry specialist auditor. More recently, [Lopez & Vega \(2019\)](#) find that audits performed by firms with longer industry specialist durations are associated with lower levels of AEM and with greater levels of REM.

Overall, there is a lack of comprehensive study of the impact of audit quality on REM in developing countries such as Malaysia, especially after considering the independence of auditors. Unlike [Burnett et al. \(2012\)](#), [Chi et al. \(2011\)](#) and [Lopez & Vega \(2019\)](#), our study addresses the impact of the industry specialist auditor and auditor independence on REM, and the role of auditor independence on the relationship between audit quality and REM, selecting sample companies from a developing market, with less litigation risk and in a less regulated context.

In sum, REM studies suggest that audit quality may encourage companies to resort to moving from AEM to REM, as REM is less costly to management because it is less likely to attract the scrutiny of the audit firm or regulator ([Chi et al., 2011](#); [Cohen et al., 2008](#)). However, there are few studies into the relationship between audit quality and REM, which would be more relevant to the role of auditor independence. This justifies the need to provide a better understanding of the relationship between audit quality and REM.

3.2. Hypothesis development

3.2.1. Specialist auditor and real earnings management

Information asymmetries between managers and owners could be reduced by a high-quality auditor who validates

financial statements. An industry specialist auditor is considered as a significant indicator of audit quality because he/she has competency and reputation incentives to provide high-quality audit and, thus, the credibility of financial reporting ([Chi et al., 2011](#); [DeFond & Zhang, 2014](#)). Similarly, prior studies find that companies audited by specialist auditors report less accounting restatement ([Romanus et al., 2008](#)), more disclosure ([Dunn & Mayhew, 2004](#)), and practise less AEM behaviour ([Balsam et al., 2003](#); [Krishnan, 2003](#)). In the review paper, [Habib \(2011\)](#) documents that extensive literature on the relationship between earnings management and industry specialist auditors concludes that firms with specialist auditors are less likely to practice earnings management activities. In contrast, [Lim & Tan \(2009\)](#) find a positive relationship between a specialist auditor and the timeliness of accounting recognition of economic losses. [Lys & Watts \(1994\)](#) find no evidence of different levels of auditor litigation between industry specialists and non-specialists.

In the REM literature, [Chi et al. \(2011\)](#) examine the impact of higher-quality audit firms on REM; they conclude that industry auditor specialization and audit fees are positively related with REM. [Burnett et al. \(2012\)](#) investigate the effect of industry specialist auditors on the trade-off between AEM and REM and find that companies employing a specialist audit firm are more likely to use REM measured by accretive stock repurchases and less likely to use AEM. [Lopez & Vega \(2019\)](#) support these results and find that audits performed by firms with longer industry specialist duration are associated with lower levels of AEM and greater levels of REM. On the other hand, [Fargher et al. \(2019\)](#) find that banks audited by specialist auditors, including both Big 4 and non-Big 4 specialists, are associated with lower REM. Thus, inconsistently, mixed results on the relationship between specialist auditors and REM are shown by prior studies.

In summary, the literature suggests that specialist auditors increase the likelihood of constraining managers' accounting flexibility, and consequently AEM. Further, REM and AEM could act as substitutes ([Cohen et al., 2008](#); [Zang, 2012](#)), so companies with industry auditor specialization may tend to use REM ([Burnett et al., 2012](#); [Chi et al., 2011](#)). In contrast, a negative association between specialist auditor and REM is documented ([Fargher et al., 2019](#)). Thus, with the competing arguments and mixed evidence presented above, the following hypothesis is non-directional:

H1: Auditor industry expertise is related to REM.

3.2.2. Auditor independence and real earnings management

According to economic theory, the incentives to audit firms to compromise their independence are related to auditee importance, measured as the percentage of specific auditee revenue divided by all other revenue ([Chung & Kallapur, 2003](#); [DeAngelo, 1981](#); [Watts & Zimmerman, 1983](#)). The presence of a strong economic bond between audit firm and auditee may incentivize the audit firm to ignore potential problems that jeopardize independence ([Simunic, 1984](#); [Zhang et al., 2007](#)). [Frankel et al. \(2002\)](#) state that an auditor with less independence will be more likely to acquiesce to auditee pressure, thereby impairing audit quality. Auditor independence has a significant effect on audit quality, so it is a critical issue for the auditing profession ([Francis, 2004, 2011](#); [Tepalagul & Lin, 2015](#)). Thus, whether auditor independence impairs audit quality requires empirical investigation.

Prior studies use two surrogates for the threat to auditor independence. The first is non-audit fees, which increase the economic bonding between audit firms and auditees and may

impair the independence of the audit firm (Frankel et al., 2002). Srinidhi & Gul (2007) report that the ratio of non-audit fees to audit fees is significantly and negatively associated with the quality of accruals, suggesting that non-audit fees could impair audit quality due to the economic bonding. In contrast, Frankel et al. (2002) report that non-audit fees are negatively related to AEM. DeFond et al. (2002) find no evidence of a relationship between non-audit fees and impaired auditor independence. Further, Chung & Kallapur (2003) find no evidence for the relationship between auditee importance and AEM, using a sample of 1,871 US companies. Ghosh et al. (2009) state that there is no evidence of a relationship between the earnings response coefficient and the ratio of non-audit fees. Ashbaugh et al. (2013) fail to find evidence for the threat of non-audit fees impairing auditor independence. We can conclude that most of these papers fail to find supporting evidence that audit firms compromise their independence by providing more non-audit services to auditees.

The second surrogate is the amount of the audit fee that causes the audit firm to become economically dependent on a specific auditee. The researchers who support this second measure argue that audit service fees can generate similar economic bonding or reputational incentives, where the auditor may compromise his/her independence for an economically important auditee (DeAngelo, 1981; DeFond & Francis, 2005; Frankel et al., 2002; Kinney & Libby, 2002). Prior studies find that this proxy for auditor independence is related with high quasi-rents and less earnings quality (Asthana & Boone, 2012; Ghosh et al. (2009). They find that earnings management practices increase as audit fees and auditee importance increase. However, other studies conclude that companies that pay higher or abnormal audit fees are less likely to practise earnings management, suggesting that higher audit fees may reflect more audit effort and higher accrual quality (Eshleman & Guo, 2014; Frankel et al., 2002; Srinidhi & Gul, 2007).

In terms of REM, Chi et al. (2011) find that audit fees are positively related to REM, suggesting that constraining AEM may lead to an auditee paying higher audit fees to resort to more REM. However, Alhadab (2018) uses a sample of 1,055 UK firm-year observations to document that abnormal audit fees are negatively related to REM. To the best of our knowledge, there is no empirical evidence for an association between auditor independence and REM. Thus, we fill in this research gap by examining the effect of auditor independence on REM.

Based on these competing arguments and mixed empirical results of the impact of audit fees and non-audit fees on impairing auditor independence, we expect that the ratio of the audit fees from a single auditee to the total fees of the audit firm is a more relevant measure of the threat to auditor independence (Zhang et al., 2007). Thus, we use it as a measure of auditor independence, and predict the following non-directional hypothesis:

H2: *There is an association between auditor independence and REM.*

Watts & Zimmerman (1983) argue that auditors depend on quality as incentives to independence and competency. The market-based incentives giving rise to auditor independence are their reputation and litigation concerns (Dye, 1993). The ability of auditors to provide high-quality audit is referred to as auditor competency, reflected in inputs to the audit process, and expertise (DeFond & Zhang, 2014). However, the incentives and competencies of auditors to deliver a high level of audit quality can be changed by the regulat-

ory intervention (DeFond & Zhang, 2014). An industry specialist audit firm has competency and reputation incentives to provide high-quality audits (Chi et al., 2011; DeFond & Zhang, 2014). However, audit firms may compromise their independence for financially important auditees (DeAngelo, 1981; DeFond & Francis, 2005; Frankel et al., 2002; Kinney & Libby, 2002), impairing their independence and therefore audit quality. In addition, the absence of litigation against audit firms may negate their concern about potential litigation costs (Hardies et al., 2016).

Accounting authorities and regulators (e.g., SEC, Public Company Accounting Oversight Board (PCAOB), SOX, APB, and HGB) and accounting researchers (e.g., Ashbaugh et al., 2013; Craswell et al., 2002; DeAngelo, 1981; DeFond & Francis, 2005; Frankel et al., 2002; Kinney & Libby, 2002; Teplagul & Lin, 2015) have expressed concern about non-audit and audit service fees as relevant proxies of the threat to auditor independence and therefore audit quality. Despite the heightened regulatory interest worldwide in this threat, supported by a considerable number of publications, Malaysian regulators have been less interested in introducing audit independence regulations that could enable stakeholders to evaluate the economic dependence of auditors.

Drawing on the research on auditor independence, we posit that a specialist auditor with less economic bonding with the auditee and high potential litigation costs may provide higher audit quality with more impact on constraining earning management practices, and the converse. Specifically, we predict that a specialist auditor with an economically important auditee and less litigation risk is more likely to impair his/her independence and may submit to pressure from the auditee. Thus, any association between audit firm industry specialization and REM may be moderated by auditor independence. Based on the above discussion, the following interaction hypothesis is proposed:

H3: *The relationship between specialist auditors and REM is moderated by auditor independence.*

4. Method

4.1. Sample Selection

The sample of this study was all companies listed on the Bursa Malaysia from 2009 to 2016, with the exception of financial and regulated utility companies which are subject to more restrictive regulations. The sample period starts in 2009 because regulations were implemented in 2007 and 2008 to improve the effectiveness of the corporate governance framework: in 2007 the Malaysian Code on Corporate Governance was revised, and in 2008 all listed companies were mandated by the Listing Requirement Bursa Malaysia (LRBM) to disclose the costs of the IAF. The listed companies were unable to comply immediately with the new regulations, so we start our sample period in 2009. In addition, the sample period starts after the global financial crisis that began in 2008. This crisis may have motivated managers to use REM practices more extensively than AEM, in order to recover investors' confidence with little concern about its being discovered. Thus, this period is appropriate because it represents a great challenge to specialist auditors to prevent REM practices.

The DataStream database is used to obtain the data on financial items. Specialist auditor, audit fees, and IAF cost are manually collected from the companies' annual reports. After excluding financial, delisted and companies with incomplete

data, our final sample consists of 4,211 company-year observations. Table 1 presents the data collection procedure.

Table 1. Sample selection

Company-years data from 2009 to 2016	7,664
Less financial and utilities company-years	(296)
Less delisted and uncompleted data company-years	(3,157)
Final company-year observations	4,211

4.2. Dependent Variable: Real Earnings Management

Following the practice in earlier studies, including Cohen et al. (2008), Cohen & Zarowin (2010) and Roychowdhury (2006), REM is measured by using the abnormal levels of company cash flow from operations (CFOs), production costs (PRODs), and discretionary expenditure (DISEXPs) for every industry and year. Specifically, this study models the normal level of CFOs, PRODs, and DISEXPs as follows:

$$\frac{CFO_{i,t}}{TASS_{i,t-1}} = \beta_1 \frac{1}{TASS_{i,t-1}} + \beta_2 \frac{SALES_{i,t}}{TASS_{i,t-1}} + \beta_3 \frac{\Delta SALES_{i,t}}{TASS_{i,t-1}} + \varepsilon_{i,t} \quad (1)$$

$$\begin{aligned} \frac{PRODs_{i,t}}{TASS_{i,t-1}} = & \beta_1 \frac{1}{TASS_{i,t-1}} + \beta_2 \frac{SALES_{i,t}}{TASS_{i,t-1}} \\ & + \beta_3 \frac{\Delta SALES_{i,t}}{TASS_{i,t-1}} + \beta_4 \frac{\Delta SALES_{i,t-1}}{TASS_{i,t-1}} + \varepsilon_{i,t} \end{aligned} \quad (2)$$

$$\frac{DISEXP_{i,t}}{TASS_{i,t-1}} = \beta_1 \frac{1}{TASS_{i,t-1}} + \beta_2 \frac{SALES_{i,t-1}}{TASS_{i,t-1}} + \varepsilon_{i,t} \quad (3)$$

Abnormal CFOs, PRODs, and DISEXPs are the actual CFOs, PRODs, and DISEXPs minus their normal levels, calculated by the residual of equations 1, 2, and 3. $CFO_{i,t}$ represents the cash flow from operating activities in period t ; $TASS_{i,t-1}$ is the lagged total assets, $SALES_{i,t}$ represents annual sales, $\Delta SALES_{i,t}$ is the change in sales in period t , $PRODs_{i,t}$ is defined as a sum of the cost of goods sold and change in inventory, $\Delta SALES_{i,t-1}$ is the change in sales in period $t-1$, $DISEXP_{i,t}$ represents the sum of advertising, R&D, and selling, general and administrative (SG&A) expenses in period t . The aggregate measure for REM ($REMAGGR$) is calculated by combining the three individual REM variables (Cohen et al., 2008; Eng et al., 2019; Ghaleb et al., 2020). In particular, the aggregate measure of REM is calculated by multiplying the residuals from the CFOs and DISEXPs equations by -1 and adding them to the residuals of the PRODs equation.

4.3. Test Variables: Specialist Auditor and Auditor Independence

Consistent with prior research (Burnett et al., 2012; Jaggi et al., 2012; Yuan et al., 2016), an audit firm is defined as a specialist ($AUDSPEC$) if it has the largest market share in the industry group at the national level on an annual basis (in terms of audit fees). We calculate the auditors' market share based on the audit fees received from an industry to the total audit fees of all auditors in this sector; the auditor is defined as an industry expert if the firm enjoys the largest market share in the industry. $AUDSPEC$ is a dummy variable that equals one when the audit firm is classified as specialist,

and zero otherwise. Industry specialization is calculated for each year and each industry.

Audit fees could be a good signal of auditee importance. The economic theory of auditor independence suggests that an audit firm's incentives to compromise independence depend on auditee importance (DeAngelo, 1981). When the auditee's fees represent the bulk of the auditor's revenue, this may allow the auditor to become sufficiently lax to potential problems that threaten independence. Thus, an auditor who is financially more (less) reliant on a particular auditee may be less (more) independent. We follow Zhang et al. (2007) and measure auditor independence ($AUDIND$) as the ratio of the audit fee received from auditee i to the total audit fee from all the auditees on an annual basis. A high (low) ratio for $AUDIND$ indicates less (more) auditor independence. In other words, the larger the ratio of $AUDIND$, the lower is the independence and thus, auditor independence.

4.4. Control Variables

Based on previous studies the following control variables are selected. $BIG4$ audit firm and investment in internal audit function ($LogIAF$) are included as control variables because previous studies suggest that companies with good governance monitoring are less likely to permit earnings management (Ghaleb et al., 2020; Prawitt et al., 2009). We also control for the possible impact of company size by adding total assets ($LogCSIZE$) to our main model (Roychowdhury, 2006). CFO is included as a control variable to minimize the influence of earnings management measurement errors (Dechow et al., 1996; Dechow et al., 1995; Frankel et al., 2002). Return on assets (ROA) is also used as a control variable, as it is the item most likely to be affected by REM (Roychowdhury, 2006). Roychowdhury (2006), Cohen & Zarowin (2010) and Zang (2012) demonstrate that managers use REM and AEM as substitutes, although a recent study indicates that managers use both REM and AEM (Hamza & Kortas, 2019). Therefore, the absolute value of discretionary accruals (EM) is included in the model as measured in the modified Jones model (Dechow et al., 1995)². The profitability of a company ($LOSS$) is also controlled for, following the suggestion that companies which report a loss are more likely to manage earnings (Roychowdhury, 2006). Anagnostopoulou & Tsekrekos (2017) show that leverage is related to earnings management, so total debts scaled by total assets (LEV) are included to control for leverage (Cohen et al., 2008; Ghaleb et al., 2020). It is argued that companies with growth opportunities are more likely to employ REM (Roychowdhury, 2006). Thus, sales growth ($SGROWTH$) and market to book value ($MTOB$) are included in the model to control for the opportunities for companies' growth (Cohen et al., 2008; Ghaleb et al., 2020). Lastly, industry and year dummies ($INDDUMM$ & $YEARDUMM$) are included. Table 2 presents the detailed variable definitions.

4.5. Empirical Model

To test the associations between industry specialist auditors, auditor independence and REM (H1 and H2), we es-

²Following Dechow et al. (1995), this study uses the modified Jones model to measure EM as a residual from the following equation:

$$\frac{TACC_{it}}{TASS_{t-1}} = \beta_1 \frac{1}{TASS_{t-1}} + \beta_2 \left(\frac{\Delta REV_{it} - \Delta REC_{it}}{TASS_{t-1}} \right) + \beta_3 \frac{PPE_{it}}{TASS_{t-1}} + \varepsilon_{it}$$

Where $TACC$ refers to total accruals of a company, ΔREV is the change in revenues, ΔREC is the change in accounts receivable, $TASS_{t-1}$ is the lagged total assets and PPE is the property, plant, and equipment of a company.

estimate the following equation (4) based on two-way cluster-robust standard errors (firm and year) (Gow et al., 2010). The heteroscedasticity and autocorrelation problems could be controlled by clustering the standard errors by firm and by time, which provides a reliable robust standard error estimation and t-statistics (Petersen, 2009). To avoid the influence of outliers, the continuous variables are winsorized at 1 and 99 percentiles. We estimate equation (5) by adding the interaction variable (*SPEC*IND*) between *AUDSPEC* and *AUDIND* to test H3.

$$\begin{aligned} REMAGGR_{i,t} = & \beta_0 + \beta_1 AUDSPEC_{i,t} + \beta_2 AUDIND_{i,t} + \beta_3 BIG4_{i,t} \\ & + \beta_4 LogIAF_{i,t} + \beta_5 LogCSIZE_{i,t} + \beta_6 CFO_{i,t} \\ & + \beta_7 ROA_{i,t} + \beta_8 EM_{i,t} + \beta_9 LOSS_{i,t} \\ & + \beta_{10} LEV_{i,t} + \beta_{11} SGROWTH_{i,t} + \beta_{12} MTOB_{i,t} \\ & + INDDUMM + YEARDUMM + \varepsilon_{i,t} \end{aligned} \quad (4)$$

$$\begin{aligned} REMAGGR_{i,t} = & \beta_0 + \beta_1 AUDSPEC_{i,t} + \beta_2 AUDIND_{i,t} \\ & + \beta_3 SPEC * IND_{i,t} + \beta_4 BIG4_{i,t} + \beta_5 LogIAF_{i,t} \\ & + \beta_6 LogCSIZE_{i,t} + \beta_7 CFO_{i,t} + \beta_8 ROA_{i,t} \\ & + \beta_9 EM_{i,t} + \beta_{10} LOSS_{i,t} + \beta_{11} LEV_{i,t} \\ & + \beta_{12} SGROWTH_{i,t} + \beta_{13} MTOB_{i,t} \\ & + INDDUMM + YEARDUMM + \varepsilon_{i,t} \end{aligned} \quad (5)$$

Table 2. Variables' definitions

Variable	Definition
REMAGGR	= the combined variable of the three REM measurements;
AUDSPEC	= 1 if the auditor is classified as specialist auditor, and 0 otherwise;
AUDIND	= the ratio of audit fees for auditee <i>i</i> to the total audit fees of audit firm from its clients on an annual basis;
SPEC*IND	= interaction variable between AUDSPEC and AUDIND;
Big4	= 1 if the company is audited by Big4 audit firms, 0 otherwise;
LogIAF	= the natural logarithm of the costs of IAF;
LogCSIZE	= the natural logarithm of the total assets;
CFO	= 1 if the company has negative CFO, 0 otherwise;
ROA	= the proportion of the return to the total assets;
EM	= the absolute value of discretionary accruals calculated using by modified Jones model;
LOSS	= 1 if the company reported a loss, 0 otherwise;
LEV	= the ratio of total debts to total assets;
SGROWTH	= the change in sales divided by lagged sales
MTOB	= the market price of a stock divided by the book value of the stock;
INDDUMM	= a dummy variable of industries
YEARDUMM	= a dummy variable of years

5. Results and Discussion

5.1. Descriptive Statistics and Correlation Analysis

Table 3 reports industry specialization auditors and their market share through the sample period. Ernst & Young (EY) appears to show an expertise in industry products and properties sectors and keeps the leadership through the sample period, with market share ranging from 26 to 43 percent. Similarly, PWC emphasizes industry expertise in the trade and service sector, with a market share ranging from 43 to 59 percent. However, specialized auditors for the remaining industry sectors (construction, consumer products, plantation, and technology) failed to maintain their leadership over time.

Table 4. Descriptive statistics

Variable	Mean	Median	Std. Dev.	p25	p75
REMAGGR	0.000	0.149	2.004	-0.465	0.750
AUDSPEC	0.190	0.000	0.392	0.000	0.000
AUDIND	0.099	0.015	0.217	0.006	0.056
BIG4	0.514	1.000	0.500	0.000	1.000
IAF (000)	427.943	66	2,043	33.156	229.264
LogIAF	11.427	11.097	1.465	10.409	12.343
CSIZE (000)	1,939	350	7,301	140,000	1,000,000
LogCSIZE	19.820	19.674	1.539	18.757	20.723
CFO	0.217	0.000	0.412	0.000	0.000
ROA (%)	4.661	4.290	16.588	1.270	8.050
EM	0.055	0.036	0.109	0.013	0.073
LOSS	0.194	0.000	0.395	0.000	0.000
LEV (%)	8.923	0.352	13.946	0.090	15.080
SGROWTH	5.017	0.096	78.973	-0.279	2.399
MTOB	1.296	0.810	3.846	0.510	1.280

Table 4 summarizes the descriptive statistics. The mean *REMAGGR* in Malaysia is 0.000, which is similar to that stated by others (Abdul Rahman et al., 2018; Ghaleb et al., 2020), and substantially similar to larger markets such as the US is (Cohen et al., 2008). Further, the descriptive statistics highlight that 799 companies (19% of the study sample) are audited by specialist audit firms. The findings also show that the mean (median) of auditor independence is 10 (2) %. BIG4 audit firms audit 50% of the sample. The mean (median) value for *IAF* is Malaysian Ringgit RM427,943 (RM66,000), which is greater than that found by Al-Qadasi et al., (2019). For *CSIZE* it is RM1,939,000 (RM350,000). Twenty-two percent of company-observations have negative *CFO*. The means for *ROA*, *EM*, *LOSS*, *LEV*, *SGROWTH* and

Table 3. Specialist auditors and their market shares for 2009-2016

Year	Industry Sectors						
	Construction	Consumer Products	Industry Products	Plantation	Properties	Technology	Trade and Service
2009	EY (37%)	KPMG (23%)	EY (31%)	EY (37%)	EY (43%)	EY (20%)	PWC (47%)
2010	EY (37%)	KPMG (20%)	EY (31%)	KPMG (38%)	EY (42%)	Crowe Horwath (21%)	PWC (46%)
2011	EY (38%)	BDO (25%)	EY (30%)	EY (50%)	EY (40%)	Crowe Horwath (23%)	PWC (50%)
2012	EY (31%)	KPMG (25%)	EY (30%)	EY (44%)	EY (37%)	Crowe Horwath (25%)	PWC (48%)
2013	PWC (33%)	EY (44%)	EY (34%)	EY (46%)	EY (27%)	BDO (35%)	PWC (59)
2014	PWC (43%)	EY (47%)	EY (32%)	PWC (71%)	EY (30%)	BDO (35%)	PWC (48%)
2015	PWC (36%)	EY (39%)	EY (29%)	PWC (73%)	EY (29%)	KPMG (25%)	PWC (48%)
2016	PWC (32%)	EY (39%)	EY (28%)	PWC (72%)	EY (26%)	PWC (21%)	PWC (43%)

PricewaterhouseCoopers (PWC), Ernst & Young (EY).

Table 5. Pearson Correlation

Variables	REMACGR	AUDSPEC	AUDIND	BIG4	LogIAF	LogCSIZE	CFO	ROA	EM	LOSS	LEV	SGROWTH	MTOB
REMACGR	1.000												
AUDSPEC	-0.081***	1.000											
AUDIND	0.039**	-0.184***	1.000										
BIG4	-0.049***	0.404***	-0.393***	1.000									
LogIAF	-0.090***	0.209***	-0.090***	0.377***	1.000								
LogCSIZE	-0.007	-0.049***	-0.085***	0.059***	0.250***	1.000							
CFO	0.146***	-0.064***	0.025	-0.098***	-0.103***	0.014	1.000						
ROA	-0.225***	0.026*	0.048***	0.046***	0.038**	0.045***	-0.131***	1.000					
EM	-0.096***	-0.017	0.052***	-0.036**	-0.049***	0.029*	0.104***	0.437***	1.000				
LOSS	0.106***	-0.091***	0.060***	-0.137***	-0.146***	-0.040***	0.251***	-0.353***	0.075***	1.000			
LEV	0.053***	-0.050***	-0.062***	0.020	0.149***	0.695***	0.087***	-0.047***	0.018	0.060***	1.000		
SGROWTH	-0.025	-0.013	-0.015	0.011	0.014	0.074***	0.025	0.029*	0.030*	-0.033**	0.064**	1.000	
MTOB	-0.176***	0.047***	-0.047***	0.089***	0.157***	0.075***	-0.046***	0.155***	0.023	-0.052***	0.035**	0.000	1.000

*, **, *** Represent significance at 0.10, 0.05, and 0.01 levels, respectively.

MTOB are 0.05, 0.05, 0.19, 0.09, 0.05 and 1.30, respectively.

The results of correlation analysis, to examine the associations between the independent variables, are presented in Table 5. There are no correlation coefficients greater than the 0.80 threshold, indicating the absence of multicollinearity (Gujarati, 2003).

5.2. Multivariate Results

Table 6 presents the findings for the multivariate analysis addressing H1 and H2. The coefficient for AUDSPEC is negative and significant at 1%, suggesting that companies with specialist audit firms are less likely to manage earnings by daily operation activities. Our result supports the argument that industry specialist audit firms have competency and reputation incentives to deliver high audit quality (Chi et al., 2011; DeFond & Zhang, 2014). Thus, the high quality of specialist auditors allows them greater freedom to mitigate the tendency of managers to practise REM activities. However, the result is inconsistent with evidence that industry specialist auditors are positively related to REM (Burnett et al., 2012; Chi et al., 2011; Lopez & Vega, 2019), based on the argument that as a consequence of controlled AEM, auditees with higher-quality audit firms are likely to resort to more REM practice. We justify the findings which contradict those of prior studies that companies with high auditor quality have more incentive to manage earnings through real activities on account of accruals (Burnett et al., 2012), so the transformation of companies to REM and the clear increase in REM cases may increase the concern and focus of audit firms on REM practices. Thus, specialist auditors with competence and reputation incentives can impose greater audit scrutiny on companies in relation to REM, mitigating REM practices. This justifies our negative association between industry specialist auditors and REM.

Table 6 also presents findings for AUDIND on REM; the AUDIND coefficient has a significant and positive relationship with REMAGGR, meaning that auditors with a high level of independence are more likely to mitigate REM. This result supports the argument that important auditees who have greater weight in an audit firm's portfolio compromise their independence. That is, auditors with important auditees may have more incentive to support the auditees' preferences, and yield to pressure from them (Church et al., 2015; Tepalagul & Lin, 2015). This reflects our result that auditees are more likely to practise REM when they have greater weight in an audit firm's portfolio.

The last analysis examines if the observed relationship between AUDSPEC and REMAGGR is more pronounced or hidden in companies with higher or lower auditor independence. The findings of this analysis relating to H3 are provided in Model 2 in Table 6. Columns 3 and 4 report the OLS regression based on the two-way cluster-robust standard errors (firm and year) testing H3 and finding that the coefficient on the interaction term, SPEC*IND, is positive and significant at the 1% level, suggesting that companies with specialist auditors with financial reliance on their clients (less independence) are more likely to engage in REM practices. In other words, specialist audit firms with a high ratio of audit fees (less independence) are associated with more REM practices. These findings also indicate that auditor independence positively moderates the effective role of the specialist auditor in mitigating REM. This finding is in the line with the argument that the presence of economic bonding between auditor and auditee actually leads the auditor to change his/her behaviour (Lennox, 1999; Simunic, 1984). Thus, we conclude that specialist auditors who rely financially on a particular auditee may compromise their independence and become sufficiently lax to align with the interests of this auditee. This seems to indicate that if auditor independence is shifting the role of auditor specialization in monitoring REM, then the potential compromise of auditor independence may lead to a positive association between specialist auditors and REM. Table 6 also shows that the estimated models (4 and 5) are overall significant at the p-value <0.001 level; the explanatory powers of models (R²) range from 10 to 10.20 percent, indicating that these models are well-fitted.

Further tests are conducted to assess the robustness of the moderating role of AUDIND on the relationship between AUDSPEC and REMAGGR. The sample is classified into two sub-samples: high and low independence, based on the median of AUDIND. The auditor is considered as having low independence if the proportion of AUDIND is greater than the median of the yearly sample, and high independence if the ratio is lower than the median yearly sample. In Table 6, columns 5-8 present the sub-sample findings, indicating that the coefficients of AUDSPEC for the low independence sample are positive and significant at the 1% level, and suggesting that specialist auditors with a low level of independence are less likely to mitigate REM. However, in the high independence sample, AUDSPEC is negatively and significantly related to REMAGGR. These results support our main hypothesis, that the important role of a specialist auditor in limiting the practice of REM could be affected by his/her level

Table 6. Regression results

Variables	Model 4		Model 5		High Independence		Low Independence	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.
AUDSPEC	-0.292	-3.040***	-0.375	-3.750***	-0.350	-3.580***	1.159	2.620***
AUDIND	0.374	3.010***	0.333	2.730***	-	-	-	-
SPEC*IND			5.110	2.750***	-	-	-	-
BIG4	0.147	2.170**	0.165	2.410**	0.157	2.130**	0.142	0.520
LogIAF	-0.114	-3.940***	-0.134	-4.510***	-0.137	-4.050***	-0.094	-1.590
LogCSIZE	0.090	2.940***	0.085	2.790***	0.086	2.390**	0.074	1.230
CFO	0.599	7.440***	0.593	7.360***	0.545	5.890***	0.391	3.090***
ROA	-0.021	-3.070***	-0.021	-3.070***	-0.045	-5.540***	-0.003	-1.930*
EM	-0.588	-0.730	-0.582	-0.720	1.726	1.410	-3.236	-12.020***
LOSS	0.008	0.070	0.000	0.000	-0.325	-2.690***	0.132	1.130
LEV	0.008	2.910***	0.008	2.920***	0.007	2.280**	0.001	0.200
SGROWTH	-0.001	-0.700	-0.001	-0.700	-0.001	-0.660	0.001	0.400
MTOB	-0.071	-2.730***	-0.070	-2.700***	-0.057	-2.380**	-0.140	-2.080**
Intercept	0.641	1.830*	0.905	2.510	1.053	2.410**	0.301	0.470
INDDUMM	Included		Included		Included		Included	
YEARDUMM	Included		Included		Included		Included	
Obs. No.	4,211		4,211		3,400		811	
F-Value	11.900***		11.720***		9.83***		29.18***	
R2	0.100		0.102		0.105		0.251	

*, **, *** Represent significance at 0.10, 0.05, and 0.01 levels, respectively

of independence. The R² of models in Table 6, columns 5-8, range from 10 to 25.10 percent, which is comparable to previous research on the effect of audit quality and REM (Chi et al., 2011; Lopez & Vega, 2019).

In terms of control variables, the findings show that several are significant. *BIG4* is positively and significantly associated with *REMA*, probably because of the high correlation between *BIG4* and *AUDSPEC* in Table 5 (coefficient = 0.404). To evaluate any possible impact of this high correlation between *BIG4* and *AUDSPEC* on our main findings, we re-estimate our main models excluding *BIG4*. The regression results (untabulated) for all variables remain approximately the same. Consistent with recent research by Ghaleb et al. (2020), we find that companies that invest more in IAF are less likely to practise REM. The coefficients on *CSIZE*, *CFO*, and *LEV* are positively and significantly associated with *REMA*. The findings also show that there is a negative association between *MTOB* and *REMA*, indicating that a company with fewer growth opportunities is more likely to practise REM.

5.3. Robustness Tests

5.3.1. Alternative measurements for REM

In measuring REM in the main model/analysis, we define discretionary expenses as the total of R&D, advertising, and SG&A expenses in a period *t* as presented in equation (3) similar to previous studies (e.g., Cohen et al., 2008; Cohen & Zarowin, 2010; Ghaleb et al., 2021; Roychowdhury, 2006). Despite that few companies in Malaysia disclose R&D expenses, we have considered R&D expenses as zero when the data are missing, as suggested by (Cohen & Zarowin, 2010; Roychowdhury, 2006). However, Yuan et al. (2016) use intangible assets as proxies for R&D expenses as many Chinese companies do not disclose R&D expenses. To further check the validity of our results, re-measuring REM using Yuan et al. (2016) approach and replacing R&D expense with intangible

assets. Thus, calculate discretionary expenses as a total of intangible assets, advertising, and SG&A expenses in a period *t*. Then, an aggregate measurement of REM is calculated from the three REM measurements *CFOs*, *PRODs*, and new *DIS-EXPs* measurement. Table 7, columns 1-4, report the same findings for our main models using the new aggregate REM measurement, indicating that *AUDSPEC* (*AUDIND*) are negatively (positively) and significantly related to *REMA*. In terms of the interaction variable, a positive and significant association between *SPEC*IND* and *REMA* is reported at the 1% level.

In addition, following Cohen and Zarowin (2010), we measure REM by computing two aggregate metrics for it. The first metric (*REM1*) is the sum of abnormal *DIS-EXPs* multiplied by minus one and abnormal *PRODs*, and the second (*REM2*) is the sum of abnormal *DIS-EXPs* multiplied by minus one and abnormal *CFOs* multiplied by minus one. Thus, our Models 4 and 5, re-estimated using these two REM metrics, show that *AUDSPEC* (*AUDIND*) is negatively (positively) and significantly (insignificantly) associated with *REM1*. Further, the coefficient of interaction variable remains positive and significant. For *REM2*, the findings indicate a significant and negative (positive) relationship between *AUDSPEC* (*AUDIND*) and *REM2*; *SPEC*IND* is positively and negatively related to *REM2*. Thus, the findings in Table 7 indicate that our main findings are robust to alternative measures of REM.

5.3.2. Alternative measurements for independent variables (*AUDSPEC* & *AUDIND*)

Several proxies are used to measure the industry specialist auditor because it is an unobservable item (Jaggi et al., 2015). Thus, we use an alternative measure for *AUDSPEC*, where an audit firm is defined as specialist if it has the largest market share based on the total assets on an industry . annual basis (Al-Qadasi et al., 2019). We then re-estimate equations (4) and (5) for the new *AUDSPEC* measurement. Table 8, columns 1-4, show that the results are consistent with the

results of our main models, indicating a negative association between *AUDSPEC* and *REMGGR*. We also find that the new interaction variable *SPEC*IND* (*AUDSPEC* based on total assets) is positively and significantly related to *REMGGR*.

An alternative measure of *AUDIND* is used to check the robustness of our findings, following *Craswell et al. (2002)* who suggest deriving the fee dependence from the ratio of the auditee's audit fees to total audit fees plus non-audit fees of the audit firm. The findings in *Table 8*, columns 5-8, indicate that the main findings are robust to this alternative measure of *AUDIND*.

5.3.3. Control of endogeneity and self-selection bias

Endogeneity is a serious issue in accounting research, especially when using OLS regression (*Chaney et al., 2004; Larcker & Rusticus, 2010*). Audits by superior providers (specialist auditors) may not be an exogenous event (*Jaggi et al., 2015*). The audited company makes the decision to choose a specialist auditor, so companies with a low level of earning quality may hire a specialist auditor. However, *Gul et al. (2009)* report a positive association between earnings quality and industry specialist auditor. Specialist auditors have

Table 7. Regression results using alternative measurements for REM

Variables	Intangible assets instead of R&D Expenses				REM1				REM2			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.
AUDSPEC	-0.173	-2.930***	-0.234	-3.780***	-0.144	-2.150**	-0.187	-2.710***	-0.293	-3.040***	-0.379	-3.780***
AUDIND	0.134	1.740*	0.104	1.390	0.035	0.360	0.014	0.150	0.371	2.890***	0.340	2.680***
SPEC*IND	-	-	3.735	2.640***	-	-	2.631	2.820***	-	-	7.407	2.780***
BIG4	0.098	2.660***	0.111	2.980***	0.112	2.440**	0.121	2.630***	0.142	2.090**	0.162	2.380**
LogIAF	-0.095	-5.650***	-0.110	-6.400***	-0.073	-3.880***	-0.083	-4.210***	-0.112	-3.910***	-0.133	-4.500***
LogCSIZE	0.019	1.840*	0.016	1.510**	-0.003	-0.170	-0.006	-0.290	0.090	2.950***	0.085	2.800***
CFO	0.203	6.270***	0.199	6.130***	0.309	3.570***	0.306	3.540***	0.599	7.440***	0.593	7.360***
ROA	-0.005	-3.130***	-0.005	-3.120***	-0.031	-2.410**	-0.031	-2.410**	-0.021	-3.070***	-0.021	-3.070***
EM	0.373	1.620	0.378	1.630	-7.802	-3.300***	-7.798	-3.300***	-0.589	-0.730	-0.583	-0.720
LOSS	-0.010	-0.270	-0.016	-0.430	-0.089	-0.520	-0.093	-0.550	0.010	0.080	0.001	0.010
LEV	0.001	1.910*	0.001	1.940*	0.000	-0.230	0.000	-0.220	0.008	2.900***	0.008	2.920***
SGROWTH	0.000	-1.310	0.000	-1.270	0.000	-0.340	0.000	-0.340	-0.001	-0.700	-0.001	-0.700
MTOB	-0.025	-2.810***	-0.025	-2.760***	0.003	0.280	0.004	0.310	-0.071	-2.730***	-0.071	-2.700***
Intercept	0.872	4.160***	1.065	4.980***	1.332	3.970***	1.468	4.270***	0.634	1.810*	0.899	2.500**
INDDUMM	Included		Included		Included		Included		Included		Included	
YEARDUMM	Included		Included		Included		Included		Included		Included	
Obs. No.	4,211		4,211		4,211		4,211		4,211		4,211	
F-Value	7.290***		7.330***		4.900***		4.970***		11.880***		11.740***	
R2	0.042		0.046		0.418		0.418		0.100		0.102	

*, **, *** Represent significance at 0.10, 0.05, and 0.01 levels, respectively.

Table 8. Regression results using alternative measurements for independent variables and selection bias

Variables	AUDSPEC based on total assets				AUDIND based on audit and non-audit fees				Selection Bias			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.
AUDSPEC	-0.324	-3.210***	-0.402	-3.780***	-0.293	-3.040***	-0.379	-3.780***	-0.290	-3.020***	-0.378	-3.790***
AUDIND	0.375	3.030***	0.337	2.760***	0.371	2.890***	0.340	2.680***	0.377	3.050***	0.346	2.840***
SPEC*IND	-	-	4.746	2.340**	-	-	7.407	2.780***	-	-	6.576	3.200***
BIG4	0.154	2.250**	0.167	2.440**	0.142	2.090**	0.162	2.380**	0.147	2.160**	0.164	2.400**
LogIAF	-0.113	-3.950***	-0.131	-4.440***	-0.112	-3.910***	-0.133	-4.500***	-0.108	-3.020***	-0.092	-2.550**
LogCSIZE	0.089	2.910***	0.084	2.750***	0.090	2.950***	0.085	2.800***	0.090	2.930***	0.082	2.670***
CFO	0.597	7.440***	0.592	7.370***	0.599	7.440***	0.593	7.360***	0.598	7.420***	0.587	7.270***
ROA	-0.021	-3.070***	-0.021	-3.070***	-0.021	-3.070***	-0.021	-3.070***	-0.021	-3.070***	-0.021	-3.060***
EM	-0.583	-0.720	-0.579	-0.710	-0.589	-0.730	-0.583	-0.720	-0.589	-0.730	-0.587	-0.730
LOSS	0.006	0.050	-0.001	-0.010	0.010	0.080	0.001	0.010	-0.006	-0.040	-0.131	-0.890
LEV	0.008	2.960***	0.008	3.010***	0.008	2.900***	0.008	2.920***	0.008	2.890***	0.008	2.770***
SGROWTH	-0.001	-0.660	-0.001	-0.680	-0.001	-0.700	-0.001	-0.700	-0.001	-0.700	-0.001	-0.670
MTOB	-0.071	-2.720***	-0.070	-2.700***	-0.071	-2.730***	-0.071	-2.700***	-0.071	-2.720***	-0.070	-2.690***
MAILRATIO	-	-	-	-	-	-	-	-	0.056	0.200	0.516	1.670*
Intercept	0.646	1.840*	0.891	2.460**	0.634	1.810*	0.899	2.500***	0.508	0.710	-0.251	-0.340
INDDUMM	Included		Included		Included		Included		Included		Included	
YEARDUMM	Included		Included		Included		Included		Included		Included	
Obs. No.	4,211		4,211		4,211		4,211		4,211		4,211	
F-Value	11.85***		11.55***		11.880***		11.74***		11.46***		11.37***	
R2	0.100		0.102		0.100		0.102		0.100		0.103	

*, **, *** Represent significance at 0.10, 0.05, and 0.01 levels, respectively.

the experience and auditee-specific knowledge that enable them to constrain the opportunities of managers to practise earning management activities. Thus, managers may hire a low-quality auditor (non-specialist) when they intend to apply certain accounting policies, or choose a higher-quality auditor (industry-specialist) to signal that their financial reports are prepared well. Therefore, associations between specialist/non-specialist auditors and earnings quality could be endogenously determined (Jaggi et al., 2015). To address this problem of potential endogeneity (self-selection bias), the inverse Mill's ratio in a Heckman selection model is used (Chaney et al., 2004; Heckman, 1979; Larcker & Rusticus, 2010), calculated from the following Probit model (6).

$$\begin{aligned} AUDSPEC_{i,t} = & \beta_0 + \beta_1 \text{LogIAF}_{i,t} + \beta_2 \text{LogCSIZE}_{i,t} \\ & + \beta_3 \text{ROA}_{i,t} + \beta_4 \text{LOSS}_{i,t} + \beta_5 \text{LEV}_{i,t} \\ & + \beta_6 \text{IAFARRG}_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (6)$$

Where, *LogIAF* (the natural logarithm of IAF costs), *LogSIZE* (the natural logarithm of total assets), *ROA* (return on total assets), *LOSS* (the company's profitability), *LEV* (the ratio of total debts to total assets), and *IAFARRG* is the IAF arrangement, whether in-house or outsourced. We re-estimate our main models 4 and 5 after including *MAILRATIO* as a control variable. Table 8, columns 9 to 12, report the findings of the Heckman procedure, suggesting that our main findings are robust to the potential self-selection problem.

5.4. Additional Tests

5.4.1. Large and small companies

It is argued that larger auditees are more likely to hire an industry specialist auditor (Hay & Davis, 2004; Yuan et al., 2016); further, larger companies may generate a large portion of the auditor's portfolio, enabling them to obtain preferential treatment from the auditor (Sharma et al., 2011). Thus, we examine the role of auditee size on the relationships between specialist auditor and auditor independence and REM. The sample is divided into two sub-samples, large and small companies, using a median split of annual total assets. Our main models 4 and 5 are re-estimated for the sub-samples. The findings in Table 9, Panel A, indicate a negative association between *AUDSPEC* and *REMGGR* for both sub-samples. Further, the coefficient on *AUDIND* is positive and significant only for small companies. In terms of the interaction variable (*SPEC*IND*), the findings show that it is positively and significantly related to *REMGGR* for large companies, supporting the argument that large companies are more likely to be given preferential treatment by audit firms due to their significant contribution to the auditor's revenue. This result is inconsistent with our main result, that *AUDIND* has a moderating role on the relationship between *AUDSPEC* and *REMGGR* for both large and small companies.

Table 9. Regression results of sub-samples (large and small companies, high and low growth, high and low leverage)

Panel A: Large and small companies									
Variables	Small Company		Large Company		Small Company		Large Company		
	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.	
AUDSPEC	-0.225	-2.100**	-0.288	-2.130**	-0.213	-1.950*	-0.425	-2.970***	
AUDIND	0.305	2.480**	0.364	1.310	0.309	2.510**	0.244	0.910	
SPEC*IND	-	-	-	-	-1.373	-1.260	6.721	3.010***	
Intercept	0.192	0.450	1.389	2.700***	0.148	0.340	1.815	3.420***	
Control Variables	Included except LogCSIZE								
Obs. No.	2,109		2,102		2,109		2,102		
F-Value	9.87***		9.48***		9.74***		9.44***		
R2	0.129		0.156		0.130		0.160		
Panel B: High and low growth sub-samples									
	Low growth		High growth		Low growth		High growth		
	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.	
AUDSPEC	-0.209	-1.780*	-0.348	-2.320**	-0.271	-2.280**	-0.444	-2.790***	
AUDIND	0.269	1.580	0.430	2.420**	0.238	1.400	0.382	2.210**	
SPEC*IND	-	-	-	-	4.097	3.410***	5.597	1.720*	
Intercept	0.330	0.720	0.691	1.390	0.545	1.150	0.979	1.920*	
Control Variables	Included except SGROWTH								
Obs. No.	2,106		2,105		2,106		2,105		
F-Value	5.86***		9.88***		6.11***		9.49***		
R2	0.093		0.125		0.095		0.127		
Panel C: High and low leverage sub-samples									
	Low leverage		High leverage		Low leverage		High leverage		
	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.	Coef.	t-stat.	
AUDSPEC	-0.288	-2.560***	-0.325	-2.060**	-0.182	-1.340	-0.479	-2.860***	
AUDIND	0.511	3.220***	0.175	0.890	0.513	3.240***	0.073	0.380	
SPEC*IND	-	-	-	-	-11.885	-1.070	6.646	3.540***	
Intercept	0.671	1.420	0.626	1.200	0.451	0.940	1.128	2.050**	
Control Variables	Included except LEV								
Obs. No.	2,106		2,105		2,106		2,105		
F-Value	13.68***		5.28***		13.26***		5.42***		
R2	0.118		0.1094		0.119		0.116		

*, **, *** Represent significance at 0.10, 0.05, and 0.01 levels, respectively.

5.4.2. The level of company growth and leverage

Chung & Kallapur (2003) argue that companies with high growth levels could be a suitable environment for earnings management. Thus, we further analyse whether or not industry specialist and auditor independence relationship with REM is conditional on company growth. Our sample is split into high- and low-growth sub-samples based on a median split of company sales growth. We re-estimate the main models 4 and 5 after excluding *SGROWTH*. The findings in Table 9, Panel B indicate that the coefficient on *AUDSPEC* is significant and negative for both high- and low-growth companies, suggesting that the relationship between *AUDSPEC* and *REM* is not conditional on the growth of the company. However, the coefficient on *AUDIND* is significantly positive only for the sub-sample of high-growth companies, and not for the low-growth companies. For the interaction term *SPEC*IND*, the coefficient on *AUDSPEC SPEC*IND* is significantly positive for both high- and low-growth companies, which suggests an unconditional role of company growth on the impact of the interaction between industry specialist and auditor independence and REM.

High-leverage companies may resort to manipulating accounting information through earnings management to weaken close scrutiny by both potential lenders and investors (Anagnostopoulou & Tsekrekos, 2017). Anagnostopoulou & Tsekrekos (2017) conclude that there is a complementary association between AEM and REM for companies with very high leverage levels. On the other hand, the managers of low-leverage companies have less incentive to manage earnings as they are less closely scrutinized by outsiders (lenders) (Anagnostopoulou & Tsekrekos, 2017; DeFond & Jiambalvo, 1994). Thus, we re-estimate the main models 4 and 5 after splitting the sample into high and low leverage sub-samples, using a median split. The findings in Table 9, Panel C show that *AUDSPEC* is significantly and negatively related to *REMAggr* for both sub-samples. However, the coefficient on *AUDIND* is significant and positive only for the low-leverage companies; it is insignificant for the high-leverage sub-sample. This result suggests that companies with high leverage levels may attract close scrutiny from lenders, compensating for the monitoring role of the auditor and reflecting the insignificant association between *AUDIND* and *REMAggr* for these companies. Regarding to the interaction term, the results show that *SPEC*IND* is significantly and positively associated with *REMAggr* for high-leverage sub-samples.

6. Conclusion

This study revisits the mixed results on the impact of industry specialist auditors on REM. We argue that even if the specialist auditor has an effect on the probability of REM practices, it is not clear whether this would be affected by the extent of auditor independence. Thus, the aim of the study is to ascertain the impact of industry specialist and auditor independence on REM, and whether auditor independence moderates the relationship between specialist auditor and REM.

Our findings indicate that companies with a specialist audit firm are less likely to practise REM, suggesting that industry specialist auditors have competence and reputation incentives to mitigate the risk of practising REM. Second, we find that auditor independence is negatively related to REM, indicating that companies are more likely to practise REM when they represent an important auditee in the portfolio of the audit firm. Further, the extent of the independence of in-

dustry specialist auditors could affect the quality of their oversight role and make them susceptible to preferential treatment by important auditees. Our empirical evidence supports this argument, which implies that auditor independence positively moderates the negative association between an industry specialist audit firm and REM. Thus, we can conclude that the quality of audit services provided by industry specialist auditors could be reliant on the absence or presence of auditor independence. Our findings are robust under several additional tests.

Our study has several policy and practical implications. The moderating role of auditor independence on the association between the industry specialist audit firm and REM may advise policymakers regarding the current state of the auditing and accounting professions. Further, our results offer insight for academics and future researchers to consider auditor independence in examining the effect of audit quality proxies on financial reporting quality. Significantly, most of the literature in this area reports on developed countries with more sophisticated settings. We offer empirical evidence from the setting of a developing economy, Malaysia, which may help comparison and contribute to development of the auditing and accounting professions. The current study is, however, not without limitations. Generalization of our results to other audit and accounting markets might be limited, as our tests are based on the Malaysian market and its unique institutional features: lower litigation risk and less regulation of auditor independence.

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Conflict of interests

The authors declare no conflict of interests

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