Journal of Business Research 84 (2018) 253–270

Contents lists available at ScienceDirect

Journal of Business Research

journal homepage: www.elsevier.com/locate/jbusres

Audit committee financial expertise and earnings quality: A meta-analysis☆

Bilal[a], Songsheng Chen[a,*], Bushra Komal[b]

[a] Department of Accounting, School of Management and Economics, Beijing Institute of Technology, Beijing, China
[b] Department of Accounting, Business School, University of International Business and Economics, Beijing, China

ARTICLE INFO

Keywords:
Audit committee financial expertise
Accounting financial expert
Non-accounting financial expert
Earnings quality
Meta-analysis

ABSTRACT

Since the implementation of the Sarbanes–Oxley Act (SOX), a plethora of research has examined financial experts' monitoring on audit committees of financial reporting quality. However, the literature has found mixed evidence. This present study's objective is to reconcile through meta-analysis the results of 90 studies with 165,529 firm-year observations concerning the relationship between audit committee financial expertise and earnings quality. The results show that audit committee financial expertise has a positive relationship with earnings quality and that accounting financial experts have a stronger relationship with earnings quality than non-accounting financial experts. Moreover, corporate governance systems, International Financial Reporting Standards (IFRS), and SOX moderate the relationship between audit committee financial expertise and earnings quality. Additional moderators of this relationship are different proxies of earnings quality and audit committee financial expertise, financial experts' independence and busyness, the external auditor's role, and publication quality. This study provides implications for regulators in terms of tightening the definition of audit committee financial expert and the need for at least two financial experts. Further, the study identifies opportunities for future research. Specifically, we provide suggestions for the improvement of financial experts' effectiveness and the expansion of existing research. We also highlight emerging research areas.

1. Introduction

Audit committee financial expertise is the most prominent feature of audit committee effectiveness that has caught the attention of regulators in recent years (CAQ, 2016; Griffin, 2016). In the USA, the Securities and Exchange Commission's (SEC's) original definition[i] of *financial expert*, proposed by the Sarbanes–Oxley Act (SOX), was considered to be too narrow and controversial because it was restricted to only the accounting financial expertise of audit committee members who have qualifications and experience as public accountants; namely, Chartered Professional Accountants (CPAs) and Chartered Financial Analysts (CFAs) (Bryan-Low, 2002). Later,

☆ We would like to thank the Editors-in-Chief, Associate Editor, two anonymous reviewers, moderators, discussants, and participants at the 2016 and 2017 American Accounting Association (AAA) Annual Meetings and 2016 International Symposium of Frontiers of Business Research in China for helpful comments and suggestions. We acknowledge financial support from the National Natural Science Foundation of China under the project of [NSFC-71672009, 71372016] and the Specialized Research Fund for Doctoral Program of Higher Education of China [SRFD-20131101110053].

* Corresponding author.
E-mail addresses: bilal@bit.edu.cn (Bilal), chenss@bit.edu.cn (S. Chen), bushrakomal@hotmail.com (B. Komal).

[i] SOX defines a financial expert as a "person who has acquired education and experience as a public accountant (e.g., CPA, CFA) or an auditor or a principal financial officer, comptroller or principal accounting officer of a company or as possessing experience through the performance of similar functions (e.g., CEO, CFO)." Further, SOX states that a financial expert should possess the following: "(1) an understanding of GAAP and financial statements; (2) experience in (a) the preparation or auditing of financial statements of generally comparable issuers and (b) the application of such principles in connection with the accounting for estimates, accruals and reserves; (3) experience with internal accounting controls; and (4) an understanding of audit committee functions" (SEC, 2002). GAAP denotes generally accepted accounting principles.

https://doi.org/10.1016/j.jbusres.2017.11.048
Received 3 November 2016; Received in revised form 28 November 2017; Accepted 30 November 2017
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SEC's final rule broadened[ii] the scope of audit committee financial experts (ACFEs) under Section 407 of SOX by including accounting financial experts (AFEs) and non-accounting financial experts (NAFEs). Among the latter are financial experts (e.g., investment bankers and financial analysts) and supervisory experts (e.g., chief executive officers (CEOs) and firms' presidents). Likewise, other countries have specific requirements for ACFEs.

A plethora of research explores the effectiveness of the ACFEs' role in overseeing the financial reporting quality of public companies. There is also an ongoing debate about which type of expertise, by definition, has a stronger association with earnings quality: accounting or non-accounting expertise. Some studies propose a narrower definition of *financial expert* (Dhaliwal, Naiker, & Navissi, 2010; Krishnan & Visvanathan, 2008), while others suggest the advantages of a broader definition (Davidson, Xie, & Xu, 2004; Kusnadi, Leong, Suwardy, & Wang, 2014). Further research supports the claim that having both accounting and non-accounting experts on an audit committee can be beneficial in terms of earnings quality (Carcello, Hollingsworth, Klein, & Neal, 2008; Nelson & Devi, 2013). These mixed findings reveal that the impact of audit committee financial expertise on earnings quality using AFEs or NAFEs is still an open question.

The current study intends to integrate these inconclusive findings across 90 empirical studies through meta-analysis, which will enable us to achieve quantitative generalization and find moderators that are not evident when other methods, such as narrative reviews, are used. Prior meta-analytic studies and reviews examine the impact of audit committee effectiveness and corporate governance attributes on earnings management (Garcia-Meca & Sanchez-Ballesta, 2009; Larcker, Richardson, & Tuna, 2007). Pomeroy and Thornton (2008) conduct a meta-analysis on the association between audit committee independence and financial reporting quality; however, they do not consider audit committee financial expertise. Carcello, Hermanson, and Ye (2011) and Malik (2014) conduct narrative reviews on the audit committee literature and summarize the studies on financial expertise. The current study uses a meta-analytic technique, which is more effective than that of narrative reviews, to explore potential moderators across studies.

Lin and Hwang (2010) and Inaam and Khamoussi (2016) include financial expertise as a characteristic of audit committees in their meta-analyses. They find that ACFEs have a negative relationship with earnings management. Our study differs from these in four respects. First, we explore the impact of several moderators on the relationship between audit committee financial expertise and earnings quality, an issue that Lin and Hwang (2010) and Inaam and Khamoussi (2016) do not analyze. These moderators are corporate governance systems, International Financial Reporting Standards (IFRS), SOX, proxies of earnings quality, the different measures of financial experts, the ACFEs' independence and busyness, auditor firm size, auditor independence, auditor switching, and publication quality. Second, our study addresses the debate about which ACFEs (accounting or non-accounting) are more influential. This important issue is ignored by Lin and Hwang (2010) and Inaam and Khamoussi (2016). Third, prior studies examine the relationship between corporate governance attributes and earnings management but few cover audit committee financial expertise; for example, only nine studies in Lin and Hwang (2010) and 29 in Inaam and Khamoussi (2016). Our sample of 90 studies significantly outnumbers these authors' samples. Finally, our study considers several measures of earnings quality (e.g., discretionary accrual, real earnings management, conservatism, target beating, investor responsiveness to earnings, restatements, and internal control weakness), while Lin and Hwang (2010) and Inaam and Khamoussi (2016) focus only on discretionary accrual and real earnings management.

In addition, the current study contributes to the debate about necessary reforms to the composition of financial experts on audit committees. The concept release of SEC (2015) on revisions to audit committee disclosures mainly focuses on audit committees' oversight of the external auditor and ignores important reforms to such composition. The results from our meta-analysis provide implications for the regulators about introducing new regulations concerning the minimum ratio of financial experts appointed to audit committees. This study also contributes to meta-analytic research in the accounting field by graphically presenting heterogeneity across multiple studies and predicting a future true relationship between audit committee financial expertise and earnings quality via a forest plot. This approach is not used in any meta-analysis conducted in accounting and auditing literature. Khlif and Chalmers (2015) find that all meta-analytic studies in accounting research use only tables to present their results. However, Buckley, Devinney, and Tang (2014) state that meta-analytic results are more efficiently and effectively conveyed by using graphs. The current study uses the forest plot technique recommended by Neyeloff, Fuchs, and Moreira (2012). This technique is the most appropriate for archival studies in accounting literature because it is designed especially for observational data. The conceptual framework explored in our study is shown in Fig. 1.

The rest of the study is organized as follows: Section 2 provides a review of literature; Section 3 explains the method and meta-analytic procedures; Section 4 presents the results and discussion; Section 5 gives implications for regulations and directions for future research; and Section 6 offers the conclusions.

2. Review of literature

2.1. Audit committee financial expertise and earnings quality

Audit committee composition is considered important for the effective operation of such a committee (DeZoort, Hermanson, Archambeault, & Reed, 2002). In response to SEC and the mandatory requirements of SOX section 407 regarding ACFEs, a plethora of research has empirically examined the relationship between audit committee financial expertise and earnings quality. However, so far the evidence is mixed. Prior meta-analytic studies find a negative relationship between audit committee financial expertise and earnings management (Inaam & Khamoussi, 2016; Lin & Hwang, 2010). Consistent with such studies, we propose that a firm with financial experts on its audit committee enjoys a higher level of earnings quality. The general expectation is that financial experts have more advanced accounting and financial knowledge than an ordinary audit committee

[ii] SEC (2003) released final rules implementing sections 406 and 407 of SOX 2002. Although SOX and the SEC's proposed release use the term "financial expert," SEC decided to employ the term "audit committee financial expert" in its final rules to clarify that the designated person must have characteristics that are particularly relevant to an audit committee's functions. The final rules define an "audit committee financial expert" as an individual who has all of the following attributes:

- An understanding of GAAP and financial statements;
- The ability to assess the general application of GAAP in connection with accounting for estimates, accruals, and reserves;
- Experience preparing, auditing, analyzing or evaluating financial statements that present a breadth and level of complexity of accounting issues that are generally comparable to the breadth and complexity of issues that can reasonably be expected to be raised by the company's financial statements, or experience actively supervising one or more persons engaged in such activities;
- An understanding of internal controls and procedures for financial reporting; and
- An understanding of audit committee functions.

An audit committee financial expert must have acquired these attributes through any one or more of the following:

- Education and experience as a principal financial officer, principal accounting officer, controller, public accountant or auditor or experience in one or more positions that involve the performance of similar functions;
- Experience actively supervising a principal financial officer, principal accounting officer, controller, public accountant or person performing similar functions;
- Experience overseeing or assessing the performance of companies or public accountants with respect to the preparation, auditing or evaluation of financial statements; or
- Other relevant experience (SEC, 2003).

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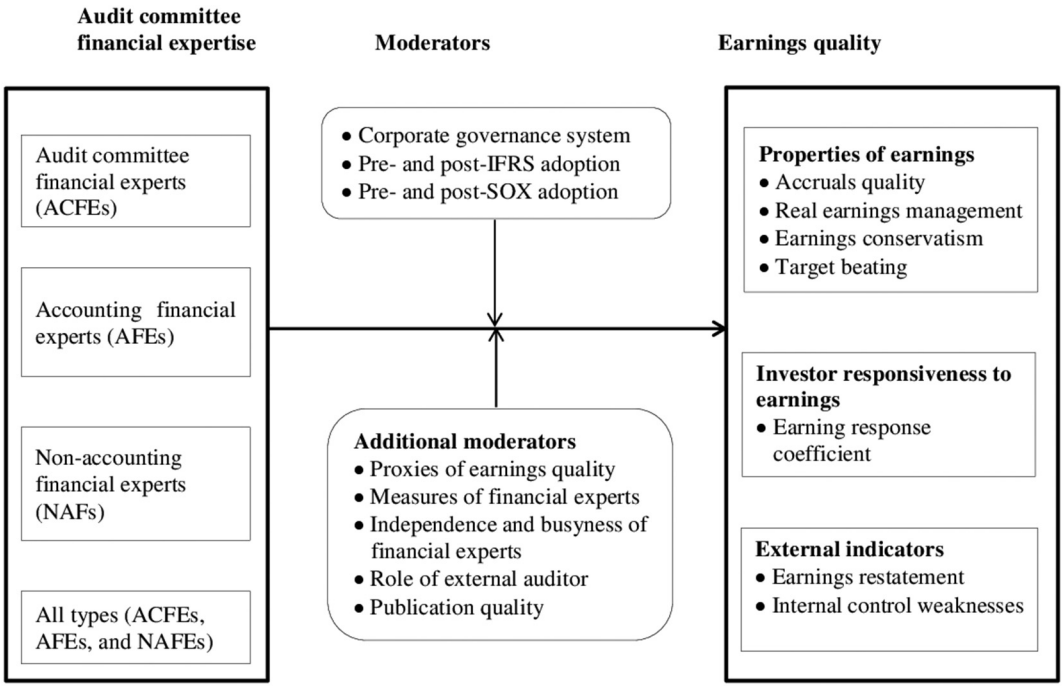

Fig. 1. The study's conceptual framework.

member. They have a better understanding and oversight of the financial reporting process and are more effective at monitoring and constraining management's activities to manipulate earnings. Their role reflects the tenets of agency theory and the need to monitor management to ensure that it employs a firm's resources in the shareholders' best interests (Beasley, Carcello, Hermanson, & Neal, 2009). Thus, the following hypothesis is developed to assess the effect of audit committee financial expertise on earnings quality.

Hypothesis 1. There is a positive association between audit committee financial expertise and earnings quality.

2.2. Accounting and non-accounting financial expertise and earnings quality

There is a continuous debate in the literature about which type of financial expert is more influential in enhancing earnings quality: accounting or non-accounting. Some studies find that AFEs and NAFEs are effective at enhancing earnings quality (Carcello et al., 2008; Kusnadi et al., 2014; Nelson & Devi, 2013). However, some studies favor AFEs (Dhaliwal et al., 2010; Krishnan & Visvanathan, 2008). Thus, it is important to answer the following question: Which type of financial expert is more strongly associated with earnings quality? Agency theory requires an audit committee to reduce agency costs by overseeing the financial reporting process and improving the quality of financial statements (Archambeault, DeZoort, & Hermanson, 2008). The relevant stream of literature focuses on AFEs and argues that these experts can enhance the effective monitoring of the financial reporting process through their technical knowledge in the accounting and auditing fields. The resource dependence perspective claims that NAFEs, such as those with financial and/or supervisory experience, can also considerably enhance the effectiveness of an audit committee by providing industry and business knowledge. Even though NAFEs do not possess specialized accounting qualifications, they have a valuable understanding of both financial and nonfinancial concerns. Thus, they can use their knowledge to judge the reasonableness of accounting procedures when their firm is exposed to business, industry, and regulatory risks (Sultana & Zahn, 2015).

Studies recommend that financial experts with accounting expertise are more effective in an audit committee's monitoring role (Carcello, Hollingsworth, Klein, & Neal, 2006; Krishnan & Visvanathan, 2008). Audit committee members are charged to perform tasks involving complex accounting issues, in which those members with accounting expertise may be more important than those who do not have such expertise (DeFond, Hann, & Hu, 2005). Indeed, audit committee members consider that accounting financial expertise is critical for a committee's effectiveness (DeZoort, 1997, 1998). We expect that, since AFEs possess more sophisticated knowledge than NAFEs, they are better able to assess complex accounting issues. Thus, we hypothesize the following.

Hypothesis 2. An audit committee's accounting financial experts have a strong association with earnings quality compared with non-accounting financial experts.

2.3. Potential moderators

2.3.1. Corporate governance systems and earnings quality

The corporate governance mechanisms under which firms operate differ across countries in terms of their histories, cultures, capital market characteristics, and legal and regulatory systems. Millar, Eldomiaty, Choi, and Hilton (2005) categorize corporate governance mechanisms into three systems: a market-based, Anglo-American business system; a stakeholder-based, communitarian system; and a state-, family-, or community-based, emerging business system. They conjecture that variations in the corporate governance structures of these three systems are due to differences in the institutional arrangements associated with them. The Anglo-American system stresses shareholder interest, has a well-developed legal framework that defines the rights and duties of three key actors (management, directors, and shareholders), and has a higher level of institutional transparency and investor confidence. The communitarian system is distinguished by limited institutional transparency in which institutional investors (e.g., banks and financial institutions) monitor a firm's performance and investment decisions, which in turn reduces the transparency of stakeholders and lowers investor confidence.

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In emerging economies, relationship-based institutions have led to a business system categorized by a concentration of ownership and the control of corporations and banks by families, a lack of transparency, and weak investor protection. In such economies, institutional transparency is closely linked with the governments' willingness to expose business to financial market forces. This exposure can weaken the perceived mode of corporate governance (i.e., the direct control and/or direction of business affairs by the government). The legal and regulatory structures determine the corporate control mechanisms. Of course, as the legal and institutional settings in a particular country change, so may the method of corporate control. Following Garcia-Meca and Sanchez-Ballesta (2009), we investigate whether the differences in the selected studies' findings are due to moderating effects of different corporate governance systems. Thus, we hypothesize as follows.

Hypothesis 3. The corporate governance system moderates the relationship between audit committee financial expertise and earnings quality.

2.3.2. IFRS adoption and earnings quality

The adoption of IFRS results in an improvement in financial reporting quality (Barth, Landsman, & Lang, 2008). IFRS remove many permissible accounting alternatives and limit managerial discretion regarding earnings manipulation. However, principle-based standards allow greater flexibility for measurements and serve as an opportunity to engage in earnings management practices (Capkun, Collins, & Jeanjean, 2016). ACFEs are more effective at constraining earnings management under IFRS (Bryce, Ali, & Mather, 2015; Marra, Mazzola, & Prencipe, 2011). IFRS adoption has improved the transparency and disclosure of a firm's financial reporting, thereby facilitating ACFEs to oversee implemented accounting procedures. Consequently, we intend to examine the difference in ACFEs' effectiveness regarding financial reporting quality in pre- and post-IFRS adoption periods. Thus, we hypothesize the following.

Hypothesis 4. IFRS adoption moderates the relationship between audit committee financial expertise and earnings quality.

2.3.3. Audit committee financial experts in the pre- and post-SOX periods

In order to determine the changes that SOX has caused regarding ACFEs' effectiveness, the selected studies are classified into pre- and post-SOX periods. The studies published pre- and post-2002 that use data before 2002 are included in the pre-SOX literature, while the post-SOX literature includes studies with data after 2002. It can be inferred from the post-SOX research that the financial knowledge and background of ACFEs are important factors, thereby reducing managers' inclination to become involved in earnings management (Ghosh, Marra, & Moon, 2010; Malik, 2014). The current study wants to explore whether the results are different in the pre- and post-SOX periods and whether they moderate the relationship between audit committee financial expertise and earnings quality. Thus, we hypothesize as follows.

Hypothesis 5. SOX adoption moderates the relationship between audit committee financial expertise and earnings quality.

2.4. Additional potential moderators

2.4.1. Proxies of earnings quality and audit committee financial expertise

Prior meta-analyses propose that, in order to reduce the heterogeneity in the results, studies must be classified with reference to variances in the measurements of the dependent variables (Garcia-Meca & Sanchez-Ballesta, 2009; Habib, 2012). The selected studies in our meta-analysis employ accruals quality, real earnings management, conservatism, target beating, investor responsiveness, earnings restatement, and internal control weakness as proxies for earnings quality. With respect to accruals quality, managers discretionally choose accounting methods and provisions that affect earnings and do not directly affect cash flow (Dechow, Ge, & Schrand, 2010). This choice provides an inverse measure of earnings quality. Most selected studies in the current research use various accruals quality models, including the Jones (1991) model, and the Modified Jones model (Dechow, Sloan, & Sweeney, 1995). The performance-matched model (Kothari, Leone, & Wasley, 2005), the Dechow and Dichev (2002) approach, and the discretionary estimation errors model (Francis, LaFond, Olsson, & Schipper, 2005) are used in the other studies. Moreover, total accruals and working capital accruals are used in accruals quality models. The total accruals model is equivalent to working capital accruals after excluding the amount of amortization and depreciation expenses for the relevant period. It estimates non-discretionary accruals and controls for the element of long-term accruals; namely, the level of plant, property, and equipment. The estimations are conditional on substantial bias while assessing the residual values and useful lives of fixed assets. However, the working capital accruals model emphasizes short-term accruals and notes that depreciation is likely to be used as a mechanism for earnings manipulation. Meta-analysis enables us to assess whether the mixed evidence in these studies is due to estimates from the models and whether ACFEs limit discretional behavior regarding long-term accruals and working capital accruals. In addition, another significant difference in the selected studies is related to the signs of discretionary accruals. Most selected studies use the absolute values of abnormal accruals, while few include signed accruals in their analyses. The absolute values of abnormal accruals estimate the degree to which managers deliberately pursue certain methods in order to manipulate earnings (Warfield, Wild, & Wild, 1995). These accruals provide only the magnitude of the manipulated earnings and do not show the direction of the manipulations. However, signed accruals show that negative discretionary accruals and positive discretionary accruals represent a conservative and aggressive accounting policy approach respectively. We test whether variances in the results are due to different signs of discretionary accruals (e.g., absolute and signed accruals).

Real earnings management is manipulated through the strategic timing of financing, investing, and operating decisions, all of which have direct effects on cash flow. Such management is also an inverse indicator of earnings quality. This study measures real earnings management following Roychowdhury (2006). Conservatism is a direct measure of earnings quality and is concerned with an accountant's inclination to require verification of good news and not bad news. Two commonly used measures of conditional conservatism are based on accounting: accrual-based loss recognition (Ball & Shivakumar, 2005) and market-based loss recognition, which refers to the timely reaction of earnings to news (Basu, 1997). The Basu (1997) model considers the timely acknowledgement of negative news in share prices, and the Ball and Shivakumar (2005) model focuses on the timely reflection of cash flows. Book-to-market ratio is used to measure unconditional conservatism.

Target-beating strategies used by management to reduce earnings quality take two techniques into consideration: the manipulation of earnings upward and the guiding of analysts' forecasts downward. Three benchmarking perspectives to measure earnings quality are identified in prior studies: earnings level, small earnings change, and analysts' forecasts (Burgstahler & Eames, 2003; Burgstahler & Eames, 2006; Matsumoto, 2002). Investor responsiveness to earnings is a direct proxy of earnings quality and measured by the earnings-response coefficient (ERC) in the selected studies. Earnings restatement and internal control weakness are external indicators and direct proxies of earnings quality. These two proxies are measured through dummy variables (i.e., 1 for the firm that has a restatement (internal control weakness) in a particular year and 0 otherwise).

Likewise, the proxies of audit committee financial expertise (dummy, proportion, and number) may be the cause of heterogeneity

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among the studies. First, the most commonly used proxy in the selected studies is the dummy variable (i.e., 1 for the presence of ACFE, AFE, or NAFE and 0 otherwise). The other two proxies are proportion (i.e., ACFEs/total members of an audit committee) and the number of financial experts. We classify our sample according to the aforementioned proxies of earnings quality and audit committee financial expertise to assess whether or not these proxies strengthen or weaken the relationship between ACFEs and earnings quality.

2.4.2. Independent financial experts and earnings quality

SOX requires ACFEs to be completely independent from a firm's management. The agency perspective assumes that ACFEs' independence can reduce agency costs and is more likely to result in effective monitoring of management's activities (Wong, 2011). The presence of an independent financial expert significantly lessens the probability of a restatement of financial statements (Agrawal & Chadha, 2005; Yang & Krishnan, 2005). However, Velte and Stiglbauer (2011) state that an independent ACFE does not lead to higher accounting quality if < 50% of audit committee members are independent financial experts. Thus, because independent members do not have any vested interest in a firm, it is expected that independent ACFEs lead to better oversight; moreover, they are associated with higher quality earnings.

2.4.3. The busyness of audit committee financial expertise and earnings quality

Fama and Jensen (1983) argue that independent directors maintain their reputations as decision experts by serving on multiple audit committees. Further, the reputation hypothesis claims that ACFEs gain experience and knowledge in the same way; thus, they conduct their responsibilities more effectively. Prior studies find that audit committee members' busyness is associated with less earnings management (Vlaminck & Sarens, 2015; Yang & Krishnan, 2005). However, when audit committee members serve on multiple audit committees, they may overcommit (Sharma & Iselin, 2012). Such busyness increases their workloads and liabilities, a situation that may affect their ability to monitor the financial reporting process effectively. This reduced oversight can cause agency conflicts because managers are able to increase their private benefits at the expense of shareholders. Based on the above arguments, it is expected that ACFEs' busyness reduces the time that is needed for them to conduct their monitoring tasks effectively.

2.4.4. External auditor and audit committee financial expertise

After the enactment of SOX, an audit committee's primary role has changed from advising to overseeing. Further, an audit committee arranges the appointment and compensation of an external auditor and pre-approves audit and non-audit services (Hoitash, Hoitash, & Bedard, 2009). In the selected studies, three key factors are used regarding the interaction between an external auditor and ACFEs: auditor firm size, independence, and switching. These factors can influence financial reporting quality and may be the cause of heterogeneity in the selected studies. The first factor, auditor firm size, is measured by an audit committee's selection from the big 4/6/8 (non-big 4/6/8) and is influenced by the demand for good (poor) quality services, which ultimately affects a firm's earnings quality. The second factor, auditor independence, requires a quality audit committee to select an independent auditor that provides high quality services (Abbott, Parker, & Peters, 2004). The selected studies use two measures for auditor independence (log transformations of audit fees and the ratio of an audit or non-audit fee to total fees). In this context, it is worth noting that ACFEs are concerned with reputation and acquire high-quality audit services, which results in high audit fees. Such higher fees for audit and non-audit services are likely to increase the economic bond between a firm and its auditor and thus impair auditor independence and earnings quality (Kinney & Libby, 2002).

Finally, auditor switching is measured through a dummy variable if an audit committee switches (does not switch) an auditor in a particular year. Auditor switching may be due to several reasons. For example, an audit committee may be unsatisfied with an auditor's performance and/or the auditor is unwilling to continue because of litigation risks, thereby influencing the ACFEs' task to improve financial reporting quality. Thus, we expect that an external auditor's role moderates the relationship between audit committee financial expertise and earnings quality.

2.4.5. Publication quality

It is also imperative to recognize that the empirical studies published in top-tier journals differ from those in other journals and from unpublished work. Usually, top-tier journals publish high quality studies that have more robust results. Editors may also reject empirical studies as uninteresting, even though they are significant (Hay, Knechel, & Wong, 2006). In order to account for this potential bias, we perform sensitivity tests to compare published and unpublished studies, thereby enabling us to assess whether or not the studies' results differ. We categorize published studies according to the journal ranking system of the Australian Business Deans Council (ABDC), a body formed by the pro vice-chancellors, executive deans, and heads of all university business faculties and schools in Australia. These journal rankings are based on four mutually exclusive rating categories: A*, A, B, and C. We also have studies in our sample that are published in lower-tier journals that are not included in the ABDC's journal rankings. Moreover, some studies have not yet been published.

3. Method

Meta-analysis is the technique that combines the rigorous findings of prior studies on a specific topic and evaluates the cumulative effect of these studies (Wolf, 1986). In order to accommodate potential variations, different combinations of keywords are used here to find studies that examine the results of the relationship between audit committee financial expertise and earnings quality. These keyword phrases are audit committee financial expertise, audit committee financial literacy, accounting expertise, non-accounting expertise, audit committee effectiveness, earnings quality, earnings management, conservatism, target beating, investor responsiveness, discretionary accruals, financial reporting quality, and corporate governance. The databases and editorial sources that this study uses include: the ISI Web of Science, ScienceDirect, EJS, EBSCO, Blackwell, Emerald, ABI Inform, and SSRN (working papers).

Top-tier accounting and auditing journals that are particularly known for publishing research on corporate governance are also consulted. These journals include *The Accounting Review, Contemporary Accounting Research, Journal of Accounting and Economics, Journal of Accounting Research, Review of Accounting Studies, Auditing: A Journal of Theory and Practice, International Journal of Auditing, Managerial Auditing, Journal of Accounting Literature, Corporate Governance: An International Review, Journal of Financial Economics, Journal of Business,* and *Finance and Accounting*. Moreover, in order to discover more research sources in this field, the references of related and recent articles are checked. The studies are selected for meta-analysis on the basis of the following inclusion criteria.

1. Empirical studies that explore the relationship between audit committee financial expertise and earnings quality.
2. Studies that report t-statistics, *p*-values, z-scores, and chi-square statistics.

The extensive literature search produced a total of 90 studies that meet the inclusion criteria. The relevant period is 2003 to 2016. The total number of firm-year observations is 165,529 from published and unpublished sources, as shown in Fig. 2.

Table 1 shows the selected studies, journal categories, sample sizes,

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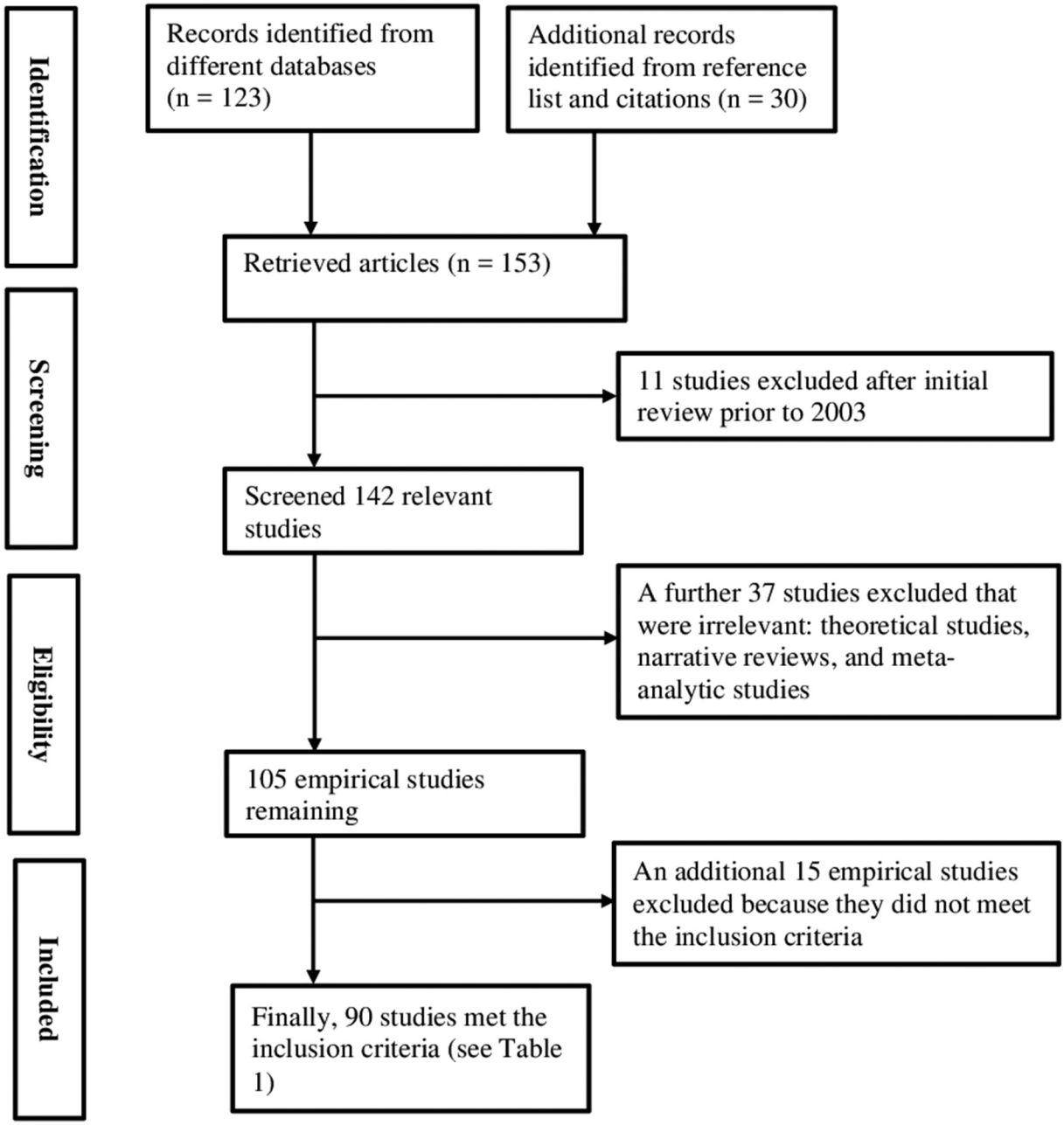

Fig. 2. Flow diagram of the study selection process.

time periods, countries, dependent and independent variables, and the findings. The studies that do not fulfill the inclusion criteria are excluded. Among the selected studies, 20 are published in the A* category of the ABDC journal ranking; 16 in the A category; four in the B category; and 14 in the C category. The lower-tier journals contain 22 studies, while 14 studies are not yet published. Most selected studies, 53 of the 90, use accruals quality as a proxy for earnings quality. Of the rest of the studies, three use real earnings management, seven use conservatism, three use target beating, five use investor responsiveness, 13 use restatement, and six use internal control weakness. The independent variable of the current study is audit committee financial expertise. Of the 90 selected studies, 40 use audit committee financial expertise in general without classification into AFEs and NAFEs. Of the remaining 50 studies, 23 use accounting financial expertise as an independent variable (ACFE[a]); 16 categorize audit committee financial expertise into accounting and non-accounting (ACFE[b]); and 10 use audit committee financial expertise in general, as well as accounting and non-accounting financial expertise (ACFE[c]). Only one study uses audit committee financial expertise and accounting financial expertise as its independent variables (ACFE[d]).

3.1. Meta-analytic procedures

Our study employs the meta-analytic procedures of Habib (2012) and Neyeloff et al. (2012). The test statistics (i.e., the t-statistics that are used in the selected studies to explore the relationship between audit committee financial expertise and earnings quality) should be converted to a standard correlation measure, which is called an effect size (ES). However, only some of the selected studies report the t-statistics; most report the *p*-values, while others report z-score and chi-square statistics that we convert into p-values. In order to convert the p-values into the ES, each *p*-value first needs to be converted to a t-statistic. The following formula, Eq. (1), is issued to compute the ES:

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Table 1
Selected studies.

Sr.	Study	PS	Sample	Period	Country	DV	IV	Findings
1	Wang, Xie, and Zhu (2015)	A*	2744	2000–07	USA	RES	ACFE	Neg
2	Baber, Kang, Liang, and Zhu (2015)	A*	166	1997–06	USA	RES	ACFE[a]	Pos and sig
3	Badolato et al. (2014)	A*	29,073	2001–08	USA	RES	ACFE[c]	Neg and sig
4	Schmidt and Wilkins (2013)	A*	418	1996–04	USA	RES	ACFE[c]	Neg
5	Cohen, Hoitash, Krishnamoorthy, and Wright (2013)	A*	18,564	2001–07	USA	RES	ACFE[b]	Neg and sig
6	Sharma and Iselin (2012)	A*	382	2001–07	USA	RES	ACFE	Neg and sig
7	Carcello, Neal, Palmrose, and Scholz (2011b)	A*	208	1999–04	USA	RES	ACFE	Neg and sig
8	Krishnan, Wen, and Zhao (2011)	A*	1182	2003–05	USA	AQ	ACFE[a]	Neg and sig
9	Dhaliwal et al. (2010)	A*	770	2004–10	USA	AQ	ACFE[b]	Neg and sig
10	Goh (2009)	A*	208	2003–04	USA	ICW	ACFE[b]	Pos and sig
11	Hoitash et al. (2009)	A*	5480	2004–06	USA	ICW	ACFE[b]	Neg and sig
12	Naiker and Sharma (2009)	A*	1225	2004	USA	ICW	ACFE[b]	Pos
13	Krishnan and Visvanathan (2008)	A*	929	2000–02	USA	CON	ACFE[b]	Pos and sig
14	Krishnan (2005)	A*	256	1994–00	USA	ICW	ACFE[c]	Neg and sig
15	Vafeas (2005)	A*	1621	1994–00	USA	TB	ACFE	Neg
16	Agrawal and Chadha (2005)	A*	119	2000–01	USA	RES	ACFE	Neg and sig
17	DeFond et al. (2005)	A*	702	2002–03	USA	ERC	ACFE[b]	Neg and sig
18	Bedard et al. (2004)	A*	300	1996	USA	AQ	ACFE	Neg and sig
19	Abbott et al. (2004)	A*	176	1991–99	USA	RES	ACFE	Neg and sig
20	Xie et al. (2003)	A*	282	1992–96	USA	AQ	ACFE[b]	Neg and sig
21	Bryce et al. (2015)	A	400	2003–08	Australia	AQ	ACFE[b]	Neg and sig
22	Sultana and Zahn (2015)	A	494	2004–08	Australia	CON	ACFE[c]	Pos
23	Sultana (2015)	A	7668	2004–12	Australia	CON	ACFE	Pos and sig
24	Kusnadi et al. (2014)	A	423	2010	Singapore	AQ	ACFE[b]	Pos and sig
25	Sharma and Kuang (2014)	A	194	2004–05	New Zealand	AQ	ACFE	Pos
26	Chen and Zhang (2014)	A	3129	2000–06	China	AQ	ACFE[a]	Neg
27	He and Yang (2014)	A	6239	2003–07	USA	AQ	ACFE	Neg and sig
28	Woidtke and Yeh (2013)	A	450	2000	East Asia	ERC	ACFE[b]	Pos and sig
29	Marra et al. (2011)	A	888	2003–06	Italy	AQ	ACFE	Neg and sig
30	Kent, Routledge, and Stewart (2010)	A	392	2000–06	Australia	AQ	ACFE[a]	Neg
31	Ghosh et al. (2010)	A	9290	1998–05	USA	AQ	ACFE	Neg
32	Baxter and Cotter (2009)	A	309	2001	Australia	AQ	ACFE[a]	Pos
33	Chang and Sun (2009)	A	106	2001–03	USA	ERC	ACFE[a]	Pos
34	Zhang, Zhou, and Zhou (2007)	A	400	2003–08	USA	ICW	ACFE[c]	Neg and sig
35	Krishnan and Visvanathan (2007)	A	416	2004–05	USA	ICW	ACFE[c]	Pos
36	Yang and Krishnan (2005)	A	896	1996–00	USA	AQ	ACFE	Neg
37	Sun, Lan, and Liu (2014)	B	100	2007–10	USA	REM	ACFE[a]	Pos
38	Saleh et al. (2007)	B	548	2001	Malaysia	AQ	ACFE[a]	Neg
39	Lin, Li, and Yang (2006)	B	212	2000	USA	RES	ACFE	Neg
40	Rahman and Ali (2006)	B	97	2002–03	Malaysia	AQ	ACFE[a]	Neg
41	Al-Thuneibat, Al-Angari, and Al-Saad (2016)	C	90	2011	Saudi Arabia	AQ	ACFE	Pos
42	Heninger, Kim, and Nabar (2009)	C	183	1997–00	USA	RES	ACFE	Pos
43	Mishra and Malhotra (2016)	C	390	2013–15	India	AQ	ACFE	Pos
44	Vlaminck and Sarens (2015)	C	60	2008–09	Belgium	AQ	ACFE[a]	Neg
45	Amar (2014)	C	425	2001–05	USA	AQ	ACFE	Neg
46	Rickling (2014)	C	3157	2004–07	USA	TB	ACFE	Neg and sig
47	Nelson and Devi (2013)	C	267	2008	Malaysia	AQ	ACFE[c]	Neg
48	Anglin, Edelstein, Gao, and Tsang (2013)	C	216	2004–08	USA	AQ	ACFE[a]	Neg
49	Habbash, Sindezingue, and Salama (2013)	C	392	2006–07	UK	AQ	ACFE[c]	Neg and sig
50	Velte and Stiglbauer (2011)	C	110	2002–09	Germany	AQ	ACFE	Neg
51	Thoopsamut and Jaikengkit (2009)	C	457	2005–06	Thailand	AQ	ACFE	Pos
52	Zahn, Mitchell, and Tower (2004)	C	485	2000–01	Singapore	AQ	ACFE	Neg
53	Choi, Jeon, and Park (2004)	C	116	2000–01	Korea	AQ	ACFE[b]	Pos
54	Williams and Tower (2004)	C	485	2000–02	Singapore	AQ	ACFE	Neg
55	Moses, Ofurm, and Egbe (2016)	N/A	75	2010–14	Nigeria	AQ	ACFE	Neg
56	Al-Rassas and Kamardin (2016)	N/A	508	2009–12	Malaysia	AQ	ACFE[a]	Neg
57	Osarumwense and Aderemi (2016)	N/A	131	2006–12	Nigeria	AQ	ACFE	Neg and sig
58	Susanto and Pradipta (2016)	N/A	244	2011–14	Indonesia	REM	ACFE[a]	Neg
59	Mohammad, Wasiuzzaman, and Salleh (2016)	N/A	1206	2004–09	Malaysia	AQ	ACFE[a]	Pos and Sig
60	Affes and Smii (2016)	N/A	100	2005–09	Tunisia	AQ	ACFE	Neg
61	Al-Rassas and Kamardin (2015)	N/A	2032	2009–12	Malaysia	AQ	ACFE[a]	Neg
62	Bala et al. (2015)	N/A	240	2009–13	Nigeria	AQ	ACFE	Neg and sig
63	Haji-Abdullah and Wan-Hussin (2015)	N/A	216	2009	Malaysia	REM	ACFE[a]	Neg
64	Elijah and Ayemere (2015)	N/A	453	2006–13	Nigeria	AQ	ACFE	Neg and sig
65	Kamolsakulchai (2015)	N/A	624	2008–12	Thailand	AQ	ACFE	Pos
66	Salleh and Haat (2014)	N/A	560	2006–09	Malaysia	AQ	ACFE[b]	Neg
67	Lee (2014)	N/A	1873	2005–07	China	ERC	ACFE[a]	Neg
68	Soliman and Ragab (2014)	N/A	40	2007–10	Egypt	AQ	ACFE	Neg
69	Madawaki and Amran (2013)	N/A	70	2009	Nigeria	CON	ACFE	Pos and Sig
70	Hamdan, Mushtaha, and Al-Sartawi (2013)	N/A	50	2004–09	Jordan	AQ	ACFE[a]	Neg
71	Alkdai and Hanefah (2012)	N/A	810	2007–09	Malaysia	AQ	ACFE[a]	Neg and sig
72	Hamdan, Al-Hayale, and Aboagela (2012)	N/A	300	2004–09	Jordan	CON	ACFE[a]	Pos and Sig
73	Qi and Tian (2012)	N/A	8148	2004–10	China	AQ	ACFE	Pos and sig
74	Nelson and Jamil (2012)	N/A	120	2003–09	Malaysia	AQ	ACFE[a]	Pos

(*continued on next page*)

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Table 1 (*continued*)

Sr.	Study	PS	Sample	Period	Country	DV	IV	Findings
75	Yusof (2010)	N/A	117	2007	Malaysia	AQ	ACFE	Neg
76	Chen, Elder, and Hsieh (2007)	N/A	2024	2000–03	Taiwan	AQ	ACFE	Neg and sig
77	Bruynseels, Krishnamoorthy, and Wright (2016)	UP	16,598	2004–12	USA	AQ	ACFE[b]	Neg and sig
78	Wahab, Haron, and Marzuki (2016)	UP	1831	2007–09	Malaysia	CON	ACFE[c]	Pos
79	Kankanamge (2016)	UP	450	2012–15	Sri Lanka	AQ	ACFE	Neg and sig
80	Shafie and Zainal (2016)	UP	68	2014	Malaysia	RES	ACFE	Pos
81	Kankanamage and Shantha (2015)	UP	450	2012–15	Sri Lanka	AQ	ACFE	Neg and sig
82	Yunos, Ahmad, and Sulaiman (2014)	UP	2002	2001–07	Malaysia	CON	ACFE	Neg and sig
83	Croes (2013)	UP	1359	2008–11	EU	TB	ACFE[d]	Pos and sig
84	Samuel (2012)	UP	99	2010	Nigeria	AQ	ACFE	Pos
85	Wong (2011)	UP	1196	2005–08	Hong Kong	AQ	ACFE[c]	Neg and sig
86	Carcello et al. (2008)	UP	281	2003	USA	AQ	ACFE[b]	Neg and sig
87	Baxter (2007)	UP	201	2001	Australia	AQ	ACFE[a]	Neg and sig
88	Dhaliwal, Naiker, and Navissi (2006)	UP	15,269	1995–98	USA	AQ	ACFE[b]	Neg and sig
89	Baber, Kang, and Liang (2006)	UP	204	1997–02	USA	RES	ACFE[a]	Neg
90	Bryan, Liu, and Tiras (2005)	UP	1291	1996–00	USA	ERC	ACFE	Pos and sig

Notes: The final sample is 165,529 firm-year observations for studies published from 2003 to 2016. PS is publication status. A*, A, B, and C are the journal rankings of the Australian Business Deans Council (ABDC). N/A indicates journals not indexed in the ABDC rankings and UP indicates unpublished work (working papers, theses, and conference papers). For dependent variables (DV) and independent variables (IV), we use the following abbreviations. For the dependent variables, AQ = accruals quality, REM = real earnings management, TB = target beating, CON = conservatism, ERC = earnings response coefficient, RES = restatement, and ICW = internal control weakness. For the independent variables, ACFE = audit committee financial expertise, ACFE[a] = audit committee accounting expertise only, ACFE[b] = both audit committee accounting and non-accounting expertise, ACFE[c] = audit committee financial expertise as well as accounting and non-accounting expertise, and ACFE[d] = audit committee financial expertise and accounting expertise.

$$ES = \frac{t}{\sqrt{t^2 + df}} \quad (1)$$

where t = t-statistic and df = degree of freedom. The latter is equal to (n − 3), where n is each study's sample size.

Each study's ES is calculated as an outcome. We use one ES per study for the overall meta-analytic results. This approach follows Schmidt and Hunter (1990) and Garcia-Meca and Sanchez-Ballesta (2009) to maintain independence between observations. In the subgroup and moderator analyses, we employ the original number of ESs used in the selected studies.[iii]

After computing each study's ES, the standard error (SE_{es}) can be calculated by using Eq. (2) as follows:

$$SEes = \frac{ES}{\sqrt{\sum ES * n}} \quad (2)$$

where SEes = each study's standard error, ES = each study's effect size, and n = each study's sample size. Hypothesis testing in meta-analysis is undertaken through an overall z test with the formula in Eq. (3):

$$Z = \frac{ESmean}{SE} \quad (3)$$

where z = z-statistic, ESmean = the selected studies' average ES, and SE is the standard error of all studies, calculated as in Eq. (4):

$$SE = \frac{1}{\sqrt{\sum df}} \quad (4)$$

where SE = the standard error of all studies and df = the degree of freedom. The latter is equal to (n − 3), which is each study's sample size minus 3.

Thus, the overall z test used to assess the meta-analytic hypotheses and z-statistics is calculated from the above formula and compared with the tabulated z-value at 1%, 5%, and 10% significance levels. In this study, a forest plot is designed by following the steps recommended by Neyeloff et al. (2012) in order to predict a true relationship between audit committee financial expertise and earnings quality and graphically portray the results of the meta-analysis. Further, a Q test is used to explore the heterogeneity between the selected studies. A Q test is a chi-square test that has the degree of freedom of k − 1, where k is the number of studies. The null hypothesis (H_0) in the Q test is that all studies are equal. I^2 is used to quantify the heterogeneity in percentage terms for selected studies, and the value of Q is used to calculate I^2.

After quantifying the heterogeneity from the Q test and I^2, the next phase is to decide on the effect summary model (i.e., the fixed effects or random effects model). The effect summary is a regression model that predicts a true relationship between audit committee financial expertise and earnings quality. In this regard, the effect summary model is the relative point at which the ESs of all studies in the meta-analysis are compared via the forest plot. If heterogeneity is low, the fixed effects model is more appropriate; if heterogeneity is high, the random effects model is more appropriate (Neyeloff et al., 2012). The fixed effects model is used only to explore the heterogeneity due to sampling errors. Assuming that variability is not merely because of sampling error and that the effect populations have heterogeneity, we use the random effects model. In this model, a constant, V,[iv] is used to adjust each study's weight. The constant also enables adjustments for the model's outliers.

The forest plot uses the final effect summary model (random effects model) to graphically portray the heterogeneity among the studies. The ES of each study (outcome) is displayed by a square box. Further, the confidence intervals are represented with horizontal lines along a relative point effect summary model (fixed or random effects model). Visually, this plot shows that the selected studies have wider or narrower confidence intervals and inconsistent response rates, both of which indicate the heterogeneity level in mixed findings. If heterogeneity is present, moderation analysis is applied by using the aforementioned procedure on the subgroups in the selected studies to reduce the heterogeneity.

Finally, the fail-safe number is calculated to tackle the file drawer issue by revealing the number of studies that fail to illustrate significant results. This number is required in order to reverse the findings relating to a significant association between the dependent and independent variables. It is calculated as follows (Rosenthal, 1991): first, all t-statistics are converted into their corresponding *p*-values; then, all p-values are converted into z-statistics. Individual z-statistics are then combined using the formula in Eq. (5):

$$\text{Unweighted } z = \frac{\sum z}{\sqrt{N}} \quad (5)$$

[iii] Because of this, the number of studies in the overall meta-analysis does not agree with the total of the effect sizes on the subgroups.

[iv] For technical details, we recommend Neyeloff et al. (2012) because they explain the fixed and the random effects models systematically.

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where N represents the number of studies included in the meta-analysis and Z is the converted z-statistic. Finally, the fail-safe number is calculated using Eq. (6), suggested by Rosenthal (1991):

$$N_{fs} = (k^*(k^*z2 - 2.706)/2.706) \quad (6)$$

where k is the number of studies in the meta-analysis and z is the combined standard z-value for the meta-analysis. The file drawer problem as represented by the fail-safe number is only an issue when N_{fs} does not exceed the critical value calculated in Eq. (7):

$$\text{Critical value (k)} = (5^* K) + 10 \quad (7)$$

where k is the number of studies in the meta-analysis.

4. Results and discussion

The following findings can be found in Table 2: the overall meta-analytic results and the types of audit committee financial expertise that act as moderators when heterogeneity is present (i.e., ACFEs in general, AFEs, and NAFEs). Table 3 contains the results of the moderating effects of a corporate governance system, IFRS, and SOX. Finally, the results of additional moderating effects are presented as follows: the sensitivity tests of different earnings quality proxies (see Table 4); the moderating effects of various audit committee financial expertise measures, namely the dummy, proportion of experts, and number of experts (see Table 5); and the sensitivity tests of financial experts' independence and busyness, the auditor's role (e.g., auditor independence, firm size, and switching), and publication quality (see Table 6).

The effect size (ES) is calculated through t-values as described in Section 3.1. Most selected studies report *p*-values. We convert all these into two-tailed t-values using a t-distribution table. The average ES of the 90 studies (one independent ES per study) that explore the relationship between audit committee financial expertise and earnings quality is 0.03 (z-value = 12.64) as shown in Table 2. This figure is significant ($p < 0.01$) and thus strongly supports H1. Consequently, this meta-analysis confirms that a positive and significant relationship exists between audit committee financial expertise and earnings quality. Such a finding agrees with the agency theory perspective; namely, ACFEs are more effective at constraining management's opportunistic behavior and are consequently associated with an increase in earnings quality because they have more advanced accounting and financial knowledge (vis-à-vis an ordinary audit committee member) (Abbott et al., 2004; Bala, Gugong, & Kumai, 2015; Bedard, Chtourou, & Courteau, 2004; Croes, 2013; Xie, Davidson, & DaDalt, 2003). With respect to the confidence interval of ES distribution, it is concluded that there is a 95% probability that the true relationship between audit committee financial expertise and earnings quality is between 0.03 and 0.04. Further, the fail-safe number at 8549 far exceeds the critical value of 460, which indicates that the meta-analytic results are reliable.

The studies are conclusively heterogeneous because the Q-test value at 2825 is significant ($p < 0.01$) and rejects the null hypothesis (i.e., all studies are equal). Further, the I^2 rate of 97% indicates greater heterogeneity across the studies. Because of this greater heterogeneity, the random effects model is more appropriate for adjusting the variation across the studies. The results of the random effects model show that the selected studies are still heterogeneous because the Q_v is 933, which is significant ($p < 0.01$), and the heterogeneity level, I^2_v, is adjusted to 86%. The effect summary of the random effects model (es_v) is 0.039, which is used to predict the true effect size of future studies and graphically portray the heterogeneity in the selected studies through a forest plot.

The studies are graphically presented via a forest plot in Fig. 3. Because the effect summary or prediction interval is 3.9%, this forest plot predicts that further studies that explore the relationship between audit committee financial expertise and earnings quality will fall between 3.6% and 4.2%, assuming that the true effect size is normally distributed. The effect summary at 3.9% of the random effects model is a relative point at which to compare the ESs of all selected studies. This approach portrays the greater heterogeneity across all selected studies, with a few on the extreme left side and others with very wide confidence intervals. The forest plot shows that the selected studies are not consistent and reliable because of this greater heterogeneity.

Table 2
Results of the meta-analysis.

Results	Overall	ACFEs	AFEs	NAFEs		
				All	FIN	SUP
Mean ES	0.03***	0.02***	0.04**	0.004	0.02***	0.01
Standard error (SE)	0.002	0.003	0.003	0.003	0.005	0.005
Z-statistics	12.64	6.37	12.90	1.35	6.23	1.29
Lower bound	0.03	0.02	0.03	− 0.00	0.02	− 0.02
Upper bound	0.04	0.03	0.05	0.01	0.04	0.01
Fail-safe number (N_{fs})	8549	2165	4116	N/a	431	N/a
Critical value for N_{fs}	460	265	260	N/a	45	N/a
Homogeneity test (Q)	2825***	1680***	1325***	2234***	505***	58***
I^2	97%	97%	96%	99%	98%	90%
V	0.0001	0.0003	0.0003	0.0001	0.0003	0.0001
Q_V	933***	298***	262***	216***	10.46	26***
I^2_V	86%	83%	81%	85%	43%	77%
es_v (random effects)	0.039	0.052	0.053	0.034	0.031	0.020
$SEes_v$	0.002	0.003	0.003	0.003	0.007	0.003
Lower bound	0.036	0.046	0.047	0.029	0.016	0.014
Upper bound	0.042	0.057	0.058	0.039	0.045	0.025
Difference (d)				0.036***	0.02***	0.03***
Z-statistics (d)				8.37	2.93	7.42
Number of studies (N*)	90	51	50	33	7	7

Notes: ES is each study's effect size measured by the procedure given in Section 3.1. Mean ES is the average effect size score; SE = 1/√Σdf;SE = 1ΣW(df) the z-statistic = ESmean/SE, which is used to test the hypotheses; and the upper and lower bounds are the z-statistics' confidence intervals. A Q test is the most commonly used tool for checking heterogeneity. Its null hypothesis is that all studies are identical. The I^2 statistic is an excellent method to ensure the amount of heterogeneity in percentage terms. It is a much better way to check the selected studies' consistency. In the random effects model, a constant, V, is used to adjust each study's weight. Q_V is the final Q test on the basis of the random effects model and I^2_V is the random effects measure that expresses heterogeneity in percentage terms. Difference (d) shows comparisons of the average effect size of AFEs with NAFEs, FIN (financial experts), and SUP (supervisory experts), following the procedure of Altman and Bland (2003). N* represents the number of studies, as discussed in Section 3.1. For the overall analysis, the number of studies is 90 (one effect size per study). For the subgroups (ACFEs, AFEs, and NAFEs), the selected studies have single and composite types of financial expertise, as shown in Table 1. Thus, ACFEs include 51 ESs (the original number of effect sizes used in the selected studies), 40 with single and 11 with composite types. Likewise, AFEs include 50 ESs, 23 with single and 27 with composite types. NAFEs include financial and supervisory experts with 33 ESs in total, 19 with single and 14 with composite types (seven with financial experts and seven with supervisory experts).

*** Represents significance level of 1% (two-tailed).

** Represents significance level of 5% (two-tailed).

4.1. Moderation analysis

Since the selected studies are heterogeneous, we extend our analysis to determine moderators. First, the greater heterogeneity in the selected studies may be due to the presence of three subgroups that exert different types of audit committee financial expertise: ACFEs, AFEs, and NAFEs. As discussed in Section 3.1, we use the original number of ESs as employed in the selected studies for the subgroup (moderator) analyses. For the subgroups (e.g., ACFEs, AFEs, and NAFEs), the selected studies have single and composite types of financial expertise, as shown in Table 1. Thus, ACFEs include a total of 51 ESs: 40 with single and 11 with composite types. Likewise, AFEs include 50 ESs: 23 with single and 27 with composite types. The NAFEs include financial and supervisory experts with 33 ESs in total: 19 with single and 14 with composite types (seven with financial experts and seven with supervisory experts).

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Table 3
Moderation analysis.

Studies	Results	Corporate governance system				IFRS		SOX	
		ANG	COM	EMR	DEV	Pre	Post	Pre	Post
Audit committee financial experts (ACFEs)	Mean ES	0.07***	0.07**	0.04***	0.02	0.04***	0.08***	0.02***	0.04***
	Z-stat	18.04	2.16	5.51	0.99	4.54	6.66	3.27	13.12
	Q_V	180***	1.45	15.17	161***	83***	35***	43***	215***
	I^2_V	88%	38%	34%	92%	75%	58%	56%	82%
	es_v	0.12	0.03	0.05	0.03	0.06	0.09	0.06	0.05
	N_{fs}	2903	556	1139	N/a	4528	3228	1346	3311
	d		0.01	0.04***	0.06***	0.04***		0.02***	
	z-stat (d)		0.32	3.75	3.00	2.75		3.48	
	N	23	3	11	14	22	16	20	39
Accounting financial experts (AFEs)	Mean ES	0.08***	0.12	0.05***	0.03**	0.02**	0.09***	0.02***	0.05***
	z-stat	26.62	0.94	5.80	2.15	2.49	5.18	3.06	11.43
	Q_V	265***	N/a	48***	10.27*	150***	7.92	163***	183***
	I^2_V	87%	N/a	63%	71%	73%	11%	85%	78%
	es_v	0.15	N/a	0.05	0.04	0.07	0.09	0.04	0.06
	N_{fs}	6794	N/a	1675	612	1994	1493	1105	1369
	d		− 0.05	0.03***	0.03	0.07***		0.03***	
	z-stat (d)		− 0.35	3.77	1.38	3.68		4.63	
	N	28	2	14	6	24	9	25	42
Non-accounting financial experts (NAFEs)	Mean ES	0.01***		0.01	− 0.12	0.02	0.03	0.01	0.02***
	Z-stat	5.21		1.05	− 1.86	1.60	1.44	1.67	4.89
	Q_V	210***		13.86*	N/a	85***	7.34*	70***	141***
	I^2_V	86%		48%	N/a	84%	56%	86%	82%
	es_v	0.04		0.03	0.02	0.04	0.05	0.04	0.04
	N_{fs}	4711		N/a	N/a	N/a	N/a	N/a	1237
	d			0.00	0.13**	0.01		0.01	
	z-stat (d)			0.24	2.08	0.55		1.34	
	N	23		8	2	15	4	11	27

Notes: ES is each study's effect size measured by the procedure given in Section 3.1. Mean ES is the average effect size score; SE = $1/\sqrt{\Sigma dfSE} = 1\Sigma W(df)$; the z-statistic = ESmean/SE, which is used to test the hypotheses; and the upper and lower bounds are the z-statistics' confidence intervals. A Q test is the most commonly used tool for checking heterogeneity. Its null hypothesis is that all studies are identical. The I^2 statistic is an excellent method to ensure the amount of heterogeneity in percentage terms. It is a much better way to check the selected studies' consistency. In the random effects model, a constant, V, is used to adjust each study's weight. Q_V is the final Q test on the basis of the random effects model and I^2_V is the random effects measure that expresses heterogeneity in percentage terms. Difference (d) shows comparisons of the average effect size of the Anglo-American corporate governance system (ANG) with other corporate governance systems (COM, EMR, and DEV), post-IFRS and pre-IFRS, and pre-SOX and post-SOX, for all types of financial experts (ACFEs, AFEs, and NAFEs), following the procedure of Altman and Bland (2003). *N* = the number of studies (the original number of effect sizes used in the selected studies).

*** Represents significance level of 1% (two-tailed).

** Represents significance level of 5% (two-tailed).

* Represents significance level of 10% (two-tailed).

Table 2 presents the average ES of the 51 studies that explore the relationship between ACFEs and earnings quality as 0.02 (z-value = 6.37), which is less than the figure of 0.03 in the overall results and significant ($p < 0.01$). The true relationship is between 0.015 and 0.028. The results of the random effects model show the Q_v as 268 ($p < 0.01$), which indicates that the studies are heterogeneous. Moreover, the heterogeneity level, I^2_V, is 82%. The effect summary of the random effects model is 0.052 and predicts that the true ES of future studies will fall between 0.046 and 0.057. The average ES of the 50 studies that explore the relationship between AFEs and earnings quality is 0.04 (z-value = 12.90), which is greater than the figure of 0.03 in the overall results and significant ($p < 0.01$). Similarly, the average ES of the 33 studies that explore the relationship between NAFEs and earnings quality is 0.004 (z-value = 1.35), which is not significant. There is still heterogeneity across the studies because those with NAFEs have a higher heterogeneity level, I^2_V, of 85%, compared with 83% and 81% for ACFEs and AFEs respectively. Thus, we further classify the studies with NAFEs into financial and supervisory experts. However, the results are significant only with respect to financial experts, who have an average ES of 0.02 (z-value = 6.23, $p < 0.01$). Thus, the variations in the magnitudes of the average ESs and heterogeneity levels in the results of the audit committee financial expertise subgroups indicate that the subgroups (ACFEs, AFEs, and NAFEs) moderate the relationship between audit committee financial expertise and earnings quality.

In order to address the ongoing debate on the appropriate definition of financial expertise, we compare the studies that use AFEs and NAFEs by following the procedure recommended by Altman and Bland (2003). Studies with AFEs have a greater average ES of 0.04 compared with the 0.004 average ES of NAFEs, which is a significant difference of 0.036 (z-value = 8.37, $p < 0.01$). Similarly, AFEs have a greater average ES of 0.04 compared with the 0.02 average ES of NAFEs (financial experts), which is a significant difference of 0.02 (z-value = 2.93, $p < 0.01$). This evidence suggests that AFEs are more effective than NAFEs because the AFEs have a strongly positive and significant association with earnings quality. This finding supports H2 and is consistent with prior studies (Dhaliwal et al., 2010; Krishnan & Visvanathan, 2008). In particular, this meta-analysis reveals that adopting the narrower definition of *financial expert* is more likely to improve audit committee effectiveness compared with a broader definition. The findings support the agency theory perspective that the presence of AFEs, with their sophisticated knowledge of accounting and auditing, constrains management's opportunistic behavior and is associated with an increase in earnings quality.

Further, we study the moderating effects of the different corporate governance systems, IFRS, and SOX. First, the selected studies are classified into the Anglo-American (ANG), the communitarian (COM), the emerging (EMR), and the developing (DEV) corporate governance systems. Table 3 shows that all types of financial expertise have a stronger and significant relationship with earnings quality in the Anglo-American countries, which have the highest average ESs of 0.07, 0.08, and 0.01 (z-values = 18.04, 26.62, and 5.21, $p < 0.01$) for ACFEs, AFEs, and NAFEs respectively, compared with the communitarian, emerging, and developing countries. This finding agrees with the literature (Garcia-Meca & Sanchez-Ballesta, 2009). Further, the results are

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Table 4
Sensitivity analysis: earnings quality proxies.

Studies	Results	Earnings quality										
		Properties of earnings								Investor responsiveness	External indicators	
		|DA|	DA(+)	DA(−)	DA(TA)	DA(WC)	REM	CON	Beating	ERC	REST	ICW
Audit committee financial experts (ACFEs)	Mean ES	−0.05***	−0.06	−0.06	−0.04***	−0.05***		0.03***	0.02*		−0.06***	−0.09***
	Z-stat	−9.09	−1.33	−1.49	−6.89	−4.55		3.66	1.79		−11.58	−6.74
	Q_V	96***	3.86	3.93	93***	7.12		3.72	4.91		159***	68***
	I^2_V	70%	22%	24%	72%	44%		19%	59%		94%	97%
	es_v	−0.06	−0.14	−0.12	−0.06	−0.09		0.03	0.04		−0.07	−0.07
	N_{fs}	1535	N/a	N/a	1359	287		61	258		432	93
	N	30	4	4	25	5		4	3		10	3
Accounting financial experts (AFEs)	Mean ES	−0.06***	−0.05***	−0.08***	−0.06***	−0.05***	−0.047	0.07***		0.05***	−0.07***	−0.06***
	z-stat	−12.91	−5.09	−10.41	−10.45	−7.38	−1.13	4.34		2.90	−14.37	−5.20
	Q_V	139***	10.62**	32.91***	106***	15.72*	2.57	5.58		3.35	23***	214***
	I^2_V	81%	61%	87%	84%	36%	22%	46%		10%	82%	98%
	es_v	−0.06	−0.07	−0.06	−0.06	−0.05	0.05	0.07		0.05	−0.09	−0.06
	N_{fs}	2274	190	177	1442	753	N/a	185		99	770	615
	N	27	5	5	18	9	3	4		4	5	6
Non-accounting financial experts (NAFEs)	Mean ES	−0.01	−0.01	−0.03***	−0.01**	−0.01**		0.01		0.03	−0.03***	−0.02*
	Z-stat	0.55	0.79	3.69	2.24	2.62		0.28		1.53	−6.98	−1.78
	Q_V	107***	N/a	N/a	77***	6.24		N/a		N/a	4.01	32***
	I^2_V	84%	N/a	N/a	86%	20%		N/a		N/a	25%	81%
	es_v	−0.02	N/a	N/a	−0.03	−0.02		N/a		N/a	−0.02	−0.09
	N_{fs}	N/a	N/a	22	302	55		N/a		N/a	490	N/a
	N	18	2	2	12	6		2		2	4	7

Notes: ES is each study's effect size measured by the procedure given in Section 3.1. Mean ES is the average effect size score; SE = $1/\sqrt{\Sigma df}$SE = $1\Sigma W(df)$; the z-statistic = ESmean/SE, which is used to test the hypotheses; and the upper and lower bounds are the z-statistics' confidence intervals. A Q test is the most commonly used tool for checking heterogeneity. Its null hypothesis is that all studies are identical. The I^2 statistic is an excellent method to ensure the amount of heterogeneity in percentage terms. It is a much better way to check the selected studies' consistency. In the random effects model, a constant, V, is used to adjust each study's weight. Q_V is the final Q test on the basis of the random effects model and I^2_V is the random effects measure that expresses heterogeneity in percentage terms. *N* = the number of studies (the original number of effect sizes used in the selected studies).

*** Represents significance level of 1% (two-tailed).

** Represents significance level of 5% (two-tailed).

* Represents significance level of 10% (two-tailed).

more pronounced with respect to AFEs. The selected studies from emerging countries have more pronounced results when compared with studies conducted in developing countries. Specifically, these results show that the ACFEs in emerging countries are associated with higher earnings quality than those in developing countries. However, when we compare the findings of the studies from emerging countries with the

Table 5
Sensitivity analysis: different measures of audit committee financial expertise.

Results	At least one expert (0,1)			Proportion of experts			Number of experts (#)		
	ACFEs	AFEs	NAFEs	ACFEs	AFEs	NAFEs	ACFEs	AFEs	NAFEs
Mean ES	0.03***	0.04***	0.01*	0.03***	0.03***	0.01***	0.09**	0.05***	0.04***
SE	0.006	0.006	0.006	0.003	0.003	0.003	0.005	0.007	0.005
z-Statistics	5.69	10.13	1.55	9.34	10.73	3.24	2.40	7.58	7.31
Lower bound	0.02	0.02	−0.00	0.02	0.02	0.00	0.02	0.04	0.03
Upper bound	0.05	0.05	0.01	0.03	0.04	0.01	0.17	0.06	0.05
N_{fs}	4098	4864	N/a	2851	5168	4627	615	696	585
Critical value for N_{fs}	175	150	150	130	195	130	35	40	35
Q test	541***	1121***	902***	991***	3040***	2816***	58***	123***	179***
I^2	94%	97%	97%	98%	98%	99%	93%	96%	98%
V	0.0005	0.0006	0.0001	0.0006	0.0003	0.0001	0.0104	0.0009	0.0002
Q_V	173***	122***	225***	218***	162***	134***	2.60	4.99	91***
I^2_V	81%	78%	88%	89%	78%	83%	4%	2%	96%
es_v (random effects)	0.06	0.07	0.03	0.03	0.04	0.02	0.15	0.05	0.02
$SEes_v$	0.01	0.01	0.00	0.00	0.00	0.00	0.05	0.01	0.00
Lower bound	0.05	0.06	0.03	0.02	0.03	0.03	0.06	0.04	0.01
Upper bound	0.07	0.08	0.04	0.03	0.04	0.04	0.24	0.08	0.03
Number of ES (N)	29	24	24	21	33	20	5	6	5

Notes: ES is each study's effect size measured by the procedure given in Section 3.1. Mean ES is the average effect size score; SE = $1/\sqrt{\Sigma df}$SE = $1\Sigma W(df)$; the z-statistic = ESmean/SE, which is used to test the hypotheses; and the upper and lower bounds are the z-statistics' confidence intervals. A Q test is the most commonly used tool for checking heterogeneity. Its null hypothesis is that all studies are identical. The I^2 statistic is an excellent method to ensure the amount of heterogeneity in percentage terms. It is a much better way to check the selected studies' consistency. In the random effects model, a constant, V, is used to adjust each study's weight. Q_V is the final Q test on the basis of the random effects model and I^2_V is the random effects measure that expresses heterogeneity in percentage terms. *N* = the number of studies (the original number of effect sizes used in the selected studies).

*** Represents significance level of 1% (two-tailed).

** Represents significance level of 5% (two-tailed).

* Represents significance level of 10% (two-tailed).

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Table 6
Sensitivity analysis: financial expert's independence and busyness, the external auditor, and publication quality.

Studies	Results	IND	BUSY	External Auditor			Publication Quality					
				Ind.	Size	Switch	A*	A	B	C	NA	UP
Audit committee financial experts (ACFEs)	Mean ES	0.03***	− 0.06***	0.03***	0.02***	0.05***	0.05***	0.04***		0.39***	0.03***	0.03*
	Z-stat	4.82	− 7.47	6.87	3.81	4.38	2.77	5.26		3.13	3.71	3.46
	Q_V	209***	26***	22***	244***	2.15	3.25	12*		21**	79***	8.12
	I_V^2	84%	66%	82%	89%	39%	32%	59%		57%	72%	35%
	es_v	0.05	− 0.09	0.03	0.05	0.11	0.08	0.06		0.05	0.06	0.06
	N_{fs}	1343	172	273	1189	80	1431	936		573	2711	702
	N	34	10	5	27	4	10	9		9	13	9
Accounting financial experts (AFEs)	Mean ES	0.04***	− 0.08***	0.08***	0.03***	0.08***	0.07***	0.07***	0.04	0.05***	0.03***	0.06***
	z-stat	5.65	− 17.43	3.04	9.96	12.69	19.83	5.15	1.15	2.65	2.88	11.04
	Q_V	175***	62***	10**	196***	26***	120***	28***	2.15	12***	38***	35***
	I_V^2	79%	85%	60%	85%	88%	87%	64%	7%	41%	65%	80%
	es_v	0.06	− 0.05	0.12	0.05	0.06	0.08	0.09	0.04	0.08	0.06	0.05
	N_{fs}	2161	122	172	1732	149	4090	1440	N/a	669	1563	1985
	N	38	10	5	30	6	13	10	3	5	11	8
Non-accounting financial experts (NAFEs)	Mean ES	0.01**	− 0.10	0.02***	0.01***	0.03***	0.007***	0.012		0.028	0.008	0.002
	Z-stat	2.17	− 1.52	3.78	3.45	4.15	3.69	0.65		1.32	0.51	0.54
	Q_V	43***	11	19***	133***	45***	71***	21***		28***	113***	46***
	I_V^2	68%	55%	90%	89%	84%	82%	63%		79%	98%	87%
	es_v	0.05	− 0.02	0.03	0.02	0.04	0.04	0.05		0.11	0.02	0.03
	N_{fs}	168	N/a	163	214	96	3328	N/a		N/a	N/a	N/a
	N	15	6	3	15	6	11	9		4	3	6

Notes: ES is each study's effect size measured by the procedure given in Section 3.1. Mean ES is the average effect size score; SE = $1/\sqrt{\Sigma dfSE} = 1\Sigma W(df)$; the z-statistic = ESmean/SE, which is used to test the hypotheses; and the upper and lower bounds are the z-statistics' confidence intervals. A Q test is the most commonly used tool for checking heterogeneity. Its null hypothesis is that all studies are identical. The I^2 statistic is an excellent method to ensure the amount of heterogeneity in percentage terms. It is a much better way to check the selected studies' consistency. In the random effects model, a constant, V, is used to adjust each study's weight. Q_V is the final Q test on the basis of the random effects model and I_V^2 is the random effects measure that expresses heterogeneity in percentage terms. *N* = the number of studies (the original number of effect sizes used in the selected studies).

*** Represents significance level of 1% (two-tailed).

** Represents significance level of 5% (two-tailed).

* Represents significance level of 10% (two-tailed).

studies from Anglo-American countries, there is a significant difference in the average ESs of 0.04 and 0.03 (z-values = 3.75 and 3.77, $p < 0.01$) for ACFEs and AFEs respectively, while the difference is not significant with respect to NAFEs. The strong results for Anglo-American countries may stem from higher institutional transparency, effective and independent audit committees, and greater investor protection, all of which facilitate an effective performance by ACFEs in monitoring financial reporting quality. However, the studies still have heterogeneity. The variations in the magnitudes of average ESs and heterogeneity levels in the results of studies from different countries with different corporate governance systems, compared with the main findings (see Table 2), indicate that the corporate governance system moderates the relationship between audit committee financial expertise and earnings quality, thereby strongly supporting H3.

Second, the selected studies in Table 3 are also classified on the basis of pre- and post-IFRS adoption. Many of our selected studies (39) are from countries that have not yet adopted IFRS, including the USA, India, and Tunisia. However, 41 of the selected studies are from countries that have adopted IFRS. Of these, two provide comparative pre-IFRS and post-IFRS results; 18 were conducted before IFRS adoption; 14 cover periods after IFRS adoption; and the remaining seven extend across the pre- and post-IFRS periods.[v] In Table 3, the relationship between ACFEs and earnings quality shows a significant difference (0.08 compared with 0.04) post-IFRS adoption, with an average ES of 0.04 (z-value = 2.75, $p < 0.01$). Studies with AFEs and earnings quality also show a significant difference (0.09 compared with 0.02) post-IFRS adoption, with an average ES of 0.07 (z-value = 3.68, $p < 0.01$). However, studies that explore the relationship between NAFEs and earnings quality do not show any significant difference post-IFRS adoption. Further, the studies in the post-IFRS period have lower heterogeneity compared with studies in the pre-IFRS period. The variations in the magnitudes of average ESs and heterogeneity levels in the results of pre-IFRS and post-IFRS studies, compared with the main findings (see Table 2), indicate that IFRS adoption moderates the relationship between audit committee financial expertise and earnings quality, thereby strongly supporting H4.

Third, the selected studies are classified on the basis of pre- and post-SOX periods. Studies published pre- and post-2002 that use data before 2002 are included in the pre-SOX literature, while post-SOX literature consists of studies published after 2002 that use post-2002 data. In Table 3, the relationship between ACFEs and earnings quality shows a significant difference (0.04 compared with 0.02) post-SOX, with an average ES of 0.02 (z-value = 3.48, $p < 0.01$). Studies with AFEs and earnings quality also show a significant difference (0.05 compared with 0.02) post-SOX, with an average ES of 0.03 (z-value = 4.63, $p < 0.01$). However, studies that explore the relationship between NAFEs and earnings quality do not show any significant difference post-SOX. The post-SOX studies have lower heterogeneity compared with pre-SOX studies. The variations in the magnitudes of average ESs and heterogeneity levels in the results of pre- and post-SOX studies, compared with the main findings (see Table 2), indicate that SOX adoption moderates the relationship between audit committee financial expertise and earnings quality. This finding agrees with the literature (Ghosh et al., 2010; Hoitash et al., 2009), thereby strongly supporting H5.

4.2. Sensitivity tests

The moderation analysis in Section 4.1 shows that heterogeneity still exists among the studies. We expect that additional moderators

[v] We calculate the pre- and post-IFRS ESs of the selected studies with samples that extend across the pre- and post-IFRS periods as follows: step 1) we check the IFRS adoption year of the particular country from which these samples are taken, step 2) we divide the sample sizes on the basis of IFRS adoption year to find out the pre- and post-IFRS sample (e.g., firm-year observations), and step 3) we calculate pre- and post-IFRS ESs using the same t-values (e.g., the values that explore the relationship between financial expertise and earnings quality) as the sample sizes estimated in step 2.

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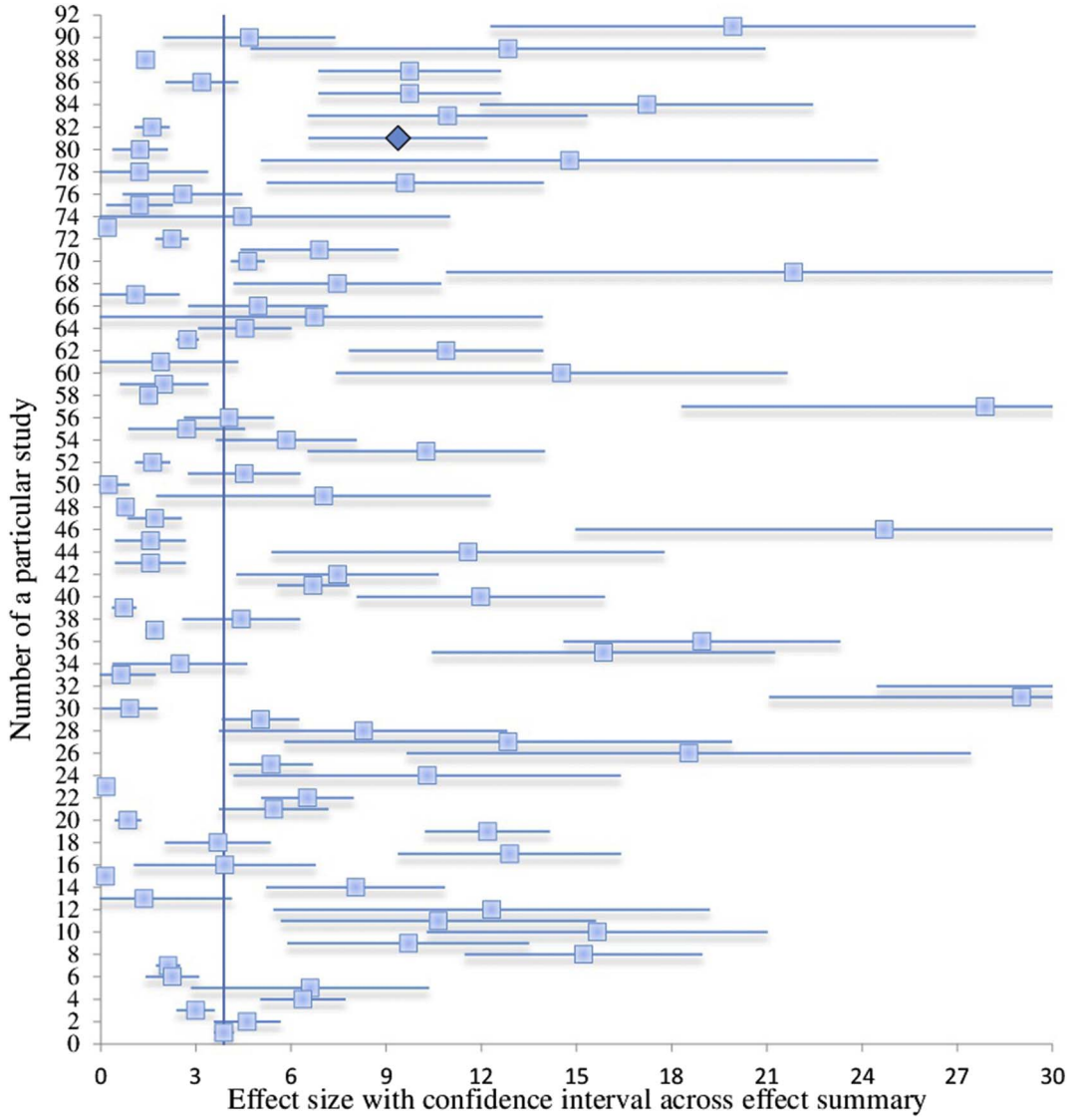

Fig. 3. Forest plot of selected studies.
Notes: The selected studies are numbered on the vertical axis while the horizontal axis represents the effect summary (random effects); thus, the graph portrays each study's effect size (each study's effect size is shown by a square box with confidence intervals represented by horizontal lines; moreover, the lines are presented along a relative point effect summary at 3.9% of the random effects model).

may be the cause of this heterogeneity in the selected studies. Thus, we conduct tests for additional potential moderators based on the constructs of earnings quality, several measures of audit committee expertise, the ACFEs' characteristics (i.e., independence and busyness), the external auditor's role, and publication quality, as shown in Tables 4–6.

The proxies of earnings quality used in the selected studies are 1) accruals quality (AQ), 2) real earnings management (REM), 3) conservatism (CON), 4) target beating (Beating), 5) investor responsiveness (ERC), 6) restatement (REST), and 7) internal control weakness (ICW), as shown in Table 4. First, AQ is measured through absolute discretionary accruals in most studies, while positive discretionary accruals (an aggressive accounting policy) and negative discretionary accruals (a conservative accounting policy) are reported by a few studies in their additional analyses. The findings reveal that the ACFEs, AFEs, and NAFEs are significantly associated with a decrease in absolute discretionary accruals (with average ESs of -0.05, -0.06, and -0.03 respectively, $p < 0.01$). The negative relationship of AQ with all types of audit committee financial expertise indicates greater accruals quality. With respect to signed discretionary accruals, the findings reveal that the AFEs and NAFEs both have a negative and significant relationship with income-increasing accruals; however, this relationship is insignificant for ACFEs. Income-decreasing accruals, though, have a negative and significant relationship with only AFEs but are insignificant with respect to ACFEs and NAFEs. Thus, the findings show that the signs of different models of discretionary accruals (absolute and signed) moderate the relationship between audit committee financial expertise and earnings quality, a finding that is consistent with prior research (Garcia-Meca & Sanchez-Ballesta, 2009). Further, the results are reported on the basis of total and working capital accruals and show that ACFEs, AFEs, and NAFEs have a negative and significant relationship with discretionary accruals, a finding that is consistent with those for absolute discretionary accruals.

Second, with respect to REM, three studies among the selected sample explore the relationship between REM and AFEs. The results show that the average ES of these studies is -0.05 (z-value $= -1.13$), which is not significant. Third, ACFEs and AFEs have a positive and significant relationship with accounting conservatism (CON), with average ESs of 0.03 and 0.07 respectively ($p < 0.01$). Fourth, with respect to Beating, three selected studies explore the relationship

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between ACFEs and target beating. The results show that the average ES of these studies is 0.02 (z-value = 1.79, $p < 0.10$). Only one study explores the relationship between AFEs and target beating; thus, the results cannot be calculated because meta-analysis requires at least two studies, following other meta-analytic studies in the accounting literature (Garcia-Meca & Sanchez-Ballesta, 2009; Habib, 2012).

Fifth, the findings reveal that only AFEs have a positive and significant relationship because the average ES of these studies is 0.05 (z-value = 2.90, $p < 0.01$). Finally, the two direct measures and external indicators of earnings quality are REST and ICW. The findings reveal that the ACFEs, AFEs, and NAFEs are all significantly associated with a decrease in REST (with average ESs of − 0.06, − 0.07, and − 0.03 respectively, $p < 0.01$). The findings also reveal that the ACFEs and AFEs are associated with a decrease in ICW (with average ESs of − 0.09 and − 0.06 respectively, $p < 0.01$), while NAFEs and ICW have a weak association because the average ES is − 0.02 (z-value = − 1.78, $p < 0.10$). However, the studies are still heterogeneous. Thus, the variations in the magnitudes of average ESs and heterogeneity levels in the results of earnings quality proxies, compared with the main results (see Table 2), indicate that the different proxies of earnings quality (i.e., accruals quality, conservatism, target beating, investor responsiveness, restatement, and internal control weakness) moderate the relationship between audit committee financial expertise and earnings quality. Dechow et al. (2010) state that the constructs based on accruals and used for measuring earnings quality are noisy and that they may cause Type I and Type II errors.

We explore the moderating effect of different measures (dummy, proportion, and number) of audit committee financial expertise as identified in the selected studies (see Table 5). The first measure of audit committee financial expertise is the dummy variable (i.e., 1 for the presence of ACFE, AFE, or NAFE and 0 otherwise). The findings reveal that ACFEs and AFEs have a positive and significant relationship with earnings quality with average ESs of 0.03 and 0.04 respectively ($p < 0.01$). The results are more pronounced with AFEs because of a higher average ES, while the results with NAFEs are insignificant. The second measure of audit committee financial expertise is proportion. The findings reveal that ACFEs, AFEs, and NAFEs have a positive and significant relationship with earnings quality with average ESs of 0.03, 0.03, and 0.01 respectively ($p < 0.01$). The third measure of audit committee financial expertise is the number of experts. The findings reveal that ACFEs, AFEs, and NAFEs have a positive and significant relationship with earnings quality with average ESs of 0.09, 0.05, and 0.04 respectively ($p < 0.01$). The results for the number of financial experts are more pronounced than those for the other two measures of audit committee financial expertise because of a higher average ES. Except for NAFEs, the studies that consider the number of financial experts have very low levels of heterogeneity (I^2_v) (i.e., 4% for ACFEs and 2% for AFEs, but 96% for NAFEs) compared with studies with the dummy variable (i.e., 81% for ACFEs, 78% for AFEs, and 88% for NAFEs) and proportion (i.e., 89% for ACFEs, 78% for AFEs, and 83% for NAFEs). Thus, the variations in the magnitudes of average ESs and heterogeneity levels in the results of different measures of audit committee financial expertise, compared with the main findings (see Table 2), indicate that the different measures of audit committee financial expertise moderate the relationship between audit committee financial expertise and earnings quality.

In Table 6, we explore the moderating effect of ACFEs' independence (IND) and busyness (BUSY). The findings reveal that IND has a positive and significant relationship with earnings quality for studies with ACFEs, AFEs, and NAFEs. The significant association of AFEs is stronger because of its higher average ES of 0.04 (z-value = 5.65, $p < 0.01$) compared with the ACFEs' average ES of 0.03 (z-value = 4.82, $p < 0.01$) and the NAFEs' average ES of 0.01 (z-value = 2.17, $p < 0.05$). The results with respect to financial experts' busyness show that ACFEs and AFEs both have a negative and significant relationship with BUSY, with average ESs of − 0.06 and − 0.08 respectively ($p < 0.01$). The results are more pronounced with AFEs because of a higher average ES, while the results with NAFEs are insignificant. The variations in the magnitudes of average ESs and heterogeneity levels in the results of independence and busyness, compared with the main results (see Table 2), indicate that ACFEs' independence and busyness moderate the relationship between audit committee financial expertise and earnings quality. Financial experts, because of the lack of independence from management, fail to effectively monitor managers' opportunistic behavior that is detrimental to earnings quality. Consistent with prior findings, our results show that a truly independent financial expert has a positive and significant association with earnings quality (Amar, 2014; Saleh, Iskandar, & Rahmat, 2007; Sharma & Kuang, 2014; Velte & Stiglbauer, 2011). Holding multiple positions at once significantly reduces the time available for financial experts to offer effective monitoring of management decisions and to provide more professional skepticism. The findings are more pronounced with respect to AFEs.

We also test the moderating effect of studies that explore the external auditor's role (e.g., auditor independence, firm size, and switching) on the relationship between audit committee financial expertise and earnings quality (see Table 6). Auditor independence and firm size both have a positive and significant relationship with ACFEs, AFEs, and NAFEs ($p < 0.01$); however, the findings are more pronounced for AFEs. These findings show that ACFEs, AFEs, and NAFEs that are affiliated with the Big 4/6/8 and independent auditors are associated with higher earnings quality. However, auditor switching has a negative relationship with ACFEs, AFEs, and NAFEs, with the results more pronounced for AFEs. This finding shows that ACFEs, AFEs, and NAFEs that switch their auditors in the first year are associated with a decrease in earnings quality. The studies, though, still have heterogeneity. The variations in the magnitudes of average ESs and heterogeneity levels in the results of studies that consider external auditor characteristics, compared with the main findings (see Table 2), indicate that auditor independence, firm size, and switching moderate the relationship between audit committee financial expertise and earnings quality.

Finally, we test the moderating effect of studies published in journals with ABDC rankings, in lower-tier journals, and unpublished studies on the relationship between audit committee financial expertise and earnings quality (see Table 6). Evidence shows that the presence of ACFEs and AFEs is associated with an increase in earnings quality in studies published in the journals with ABDC rankings of A*, A, and C. This finding is evident from the positive and statistically significant average ESs. The highest average ES is 0.07 (z-value = 19.83, $p < 0.01$) for studies published in A* journals that explore the relationship between AFEs and earnings quality. The studies in lower-tier journals and the unpublished work also have positive and significant results; however, the magnitudes of the average ESs are lower when compared with studies published in the journals that have ABDC ranking. These findings show that the top-tier journals report the most significant results. Nonetheless, studies regarding the association of NAFEs and earnings quality are significant only in the A* category with a positive and weak average ES of 0.01 (z-value = 3.69, $p < 0.01$). The studies still have heterogeneity, though. The variations in the magnitudes of average ESs and heterogeneity levels in the results of studies that consider publication quality, compared with the main findings (see Table 2), indicate that publication quality moderates the relationship between audit committee financial expertise and earnings quality.

5. Implications for regulators

How does this meta-analysis inform regulators about the definition of financial expert that is significantly associated with earnings quality? The findings reveal that AFEs have a stronger relationship with earnings quality than NAFEs. Thus, the definition of financial expert under the

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proposed rule (i.e., the narrower definition) is more effective than under the final rule (i.e., the broader definition). Moreover, NAFEs with only financial expertise have a significant relationship with earnings quality. Thus, in order to enhance and strengthen an audit committee, the definition of financial expert needs to be tightened by excluding the NAFEs with supervisory expertise. Regulators, especially in the USA, seem convinced of this. Further, our findings agree with those of White (2015), who says that a need exists to have strong, qualified ACFEs: "Just meeting the technical requirements of financial literacy may not be enough to fully understand the financial reporting requirements or to challenge senior management on major, complex decisions." Our meta-analysis suggests to regulators that, if their goal is to improve financial reporting quality, they must tighten the definition of financial expert to include only AFEs and NAFEs with financial expertise in order to instill appropriate rigor into the audit process. Section 407 of SOX requires the mere disclosure of financial experts on an audit committee. This condition is weaker than the effect of the certification requirement under either SOX section 404 on internal control effectiveness or SOX section 906 on financial statement truthfulness. Thus, together with the disclosure of ACFEs, regulators should require certification from firms about ACFEs' effectiveness.

Our findings show that the corporate governance system influences the relationship between audit committee financial expertise and earnings quality. However, the regulators in emerging and developing countries must improve the institutional transparency of their corporate governance systems in order to achieve effective monitoring of financial reporting processes by ACFEs. Our meta-analysis highlights for regulators that post-IFRS adoption is associated with higher earnings quality. This emphasis may inform regulators in jurisdictions that are planning to adopt IFRS. Our results also show that if an audit committee has multiple financial experts, its effectiveness is enhanced; indeed, such a committee is associated with the highest average ES of 0.09, which demonstrates a significant and positive relationship between audit committee financial expertise and earnings quality. The concept release issued by SEC (2015) ignores essential reforms regarding the composition of ACFE; however, our findings suggest that SEC should encourage companies to have at least two financial experts on an audit committee.

5.1. Directions for future research

Audit committee financial expertise needs the continuous attention of academicians and regulators in order to enhance its monitoring effectiveness with respect to financial reporting quality. SOX section 407 places greater stress on appearance rather than substance; however, the mere presence of financial experts does not result in an effective audit committee (Lisic, Neal, Zhang, & Zhang, 2016). All prior studies measure audit committee financial expertise by using dummy variables, the proportion of financial experts to the total of audit committee members, and the number of financial experts. Future studies must develop an appropriate construct to measure financial expertise (e.g., ACFEs' interactions with other audit committee characteristics) that depicts ACFEs' substance and effectiveness.

Our meta-analysis highlights that a country's corporate governance system significantly influences ACFEs' effectiveness. For example, the political involvement of controlling shareholders indirectly influences ACFEs' effectiveness, especially in emerging economies (e.g., China and Malaysia). The corporate governance systems in such economies differ from those in the West (i.e., Anglo-American and communitarian countries) because agency problems exist between minority and controlling shareholders instead of between managers and shareholders. In an emerging economy, in most cases, controlling shareholders hire audit committee members with whom they share political ties. We expect that future studies will address this issue by exploring how political ties between ACFEs and controlling shareholders influence the oversight of financial reporting quality.

Our findings show that independent financial experts significantly moderate the relationship between audit committee financial expertise and earnings quality. However, a problem arises when the financial experts are not truly independent and are either politically or socially connected to management, auditors, or controlling shareholders. Chen, Chou, Duh, and Lin (2014) explore the relationship between the extent of audit committee director–auditor interlocking and ERC. They find that any positive effect is more pronounced when interlocking audit committee directors are financial experts than when they are not financial experts. Chen et al. (2014) also state that ACFE–auditor interlocking is a second order of interlocking that is mostly absent in research. Researchers should also study the social connections between ACFEs and management through controlled experiments because these connections directly influence ACFEs' monitoring role. It is not possible to report true causation through a controlled experiment in a corporate governance field; thus, we encourage more research to explore how financial experts' monitoring role is affected in the presence of ACFE–auditor interlocking or ACFE–management interlocking.

Another important research area is financial experts' busyness. We find that busy financial experts significantly moderate the relationship between audit committee financial expertise and earnings quality. Future studies should explore the moderating role played by financial experts' busyness and consider how this could influence the effectiveness of the governance mechanism in constraining earnings management, which ultimately leads to improved earnings quality. The role of status, or ACFEs' reputational concerns, also plays a critical function in improving monitoring activities. The appointment of CFOs and/or retired audit partners to an audit committee under SOX section 407 affects the committee's status because these individuals are unlikely to be appointed as directors. This decline in status leads to ineffectiveness on the part of ACFEs in constraining earnings management practices (Badolato, Donelson, & Ege, 2014). Future studies could explore how the level of busyness and the concern with reputation influence ACFEs' monitoring of financial reporting quality. Another important area for future research is the monitoring effectiveness of a newly appointed ACFE. It is expected that an ACFE performs exceptionally well in the first year in order to build a good reputation; however, it is important to explore whether such an ACFE can sustain a high level of attentiveness over time (Affes & Smii, 2016). We encourage authors to contribute to this inquiry through archival research about the effectiveness of ACFEs in their first year compared with the subsequent years of their appointments.

Another potential area for future research is to consider the interaction of ACFEs with the external auditor. The increased amount of audit committee disclosures through different concept releases (e.g., audit committee disclosures and audit quality indicators), by the SEC and the Public Company Accounting Oversight Board (PCAOB) in the USA and similar institutions in other countries, may provide the data for exploring the oversight of auditors by ACFEs in terms of improving financial reporting quality. Thus, we encourage future studies to focus on how ACFEs ensure the external auditor's independence and competence. Future studies should also explore how the external auditor's role (in the context of auditor independence, size, and switching) influences ACFEs' effectiveness at exercising their monitoring of financial reporting quality.

Another potential area for future research is audit committees' human and social capital. Chang, Chen, Cheng, and Zhou (2017) state that a powerful CEO is more likely to influence audit committee effectiveness. Because an audit committee depends on management for information to perform effective monitoring functions, a powerful CEO may provide either less or lower-quality information. Further, when the CEO is powerful, the audit committee has less control over setting its own agenda, a situation that moderates the audit committee's effectiveness. Future studies should investigate how ACFEs' human and social capital can counterbalance any CEO influence. Indeed, both social capital (i.e., collaborative ties among audit committee members) and

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human capital (i.e., experience, skills, and knowledge) may affect an audit committee's ability to influence others. Systematic studies may shed light on the roles of audit committee human capital, and internal and external social capital.

An ACFE's age is another important factor that influences monitoring effectiveness. Ongoing changes in the business environment and job complexity make it difficult for older members to efficiently learn any changes and effectively perform their duties (Masulis, Wang, Xie, & Zhang, 2017). This is especially true when ACFEs are overcommitted and have less time because of their increased workload. As people become older, their physical strength and mental acumen gradually decline. We expect future studies to find that older ACFEs may not have the same vigor and concentration as their younger counterparts for observing, assessing, monitoring, and engaging with management.

Although this meta-analysis makes contributions to accounting literature, it is subject to limitations. First, the selected studies have used accrual-based earnings quality constructs, which are very noisy and have a self-selection bias. Second, the findings of this meta-analysis must be interpreted carefully because of heterogeneity in the selected studies. Finally, because the selected studies are limited to listed companies only, future studies must consider the relationship between audit committee financial expertise and earnings quality in non-listed companies.

6. Concluding remarks

Through meta-analysis, we reconcile the mixed findings of 90 empirical studies that explore the relationship between audit committee financial expertise and earnings quality. We conclude that audit committee financial expertise has a positive relationship with earnings quality and that AFEs are more strongly associated with earnings quality. We also find that corporate governance systems, IFRS, and SOX moderate the relationship between audit committee financial expertise and earnings quality. Moreover, ACFEs have a stronger relationship with earnings quality with respect to the Anglo-American corporate governance system, post-IFRS and SOX. In addition, our study finds the following moderators: different proxies of earnings quality and audit committee financial expertise, financial experts' independence and busyness, the external auditor's role, and publication quality. The findings must be interpreted carefully because of the inherent limitation of subjectivity in the accrual-based measure of earnings quality; thus, we encourage future research to address this issue by using unbiased measures of earnings quality. Further, the findings show that the inclusion of multiple ACFEs in audit committees is important for effectiveness. Finally, this meta-analysis provides practical implications for regulators in terms of (1) tightening the definition of a financial expert, (2) requiring companies to have at least two financial experts on an audit committee, and (3) certifying financial experts' effectiveness through disclosure.

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Bilal, Doctoral student, Department of Accounting, School of Management & Economics, Beijing Institute of Technology, Beijing, China. His research interests include Meta-analytical Accounting Research, Financial Accounting, Corporate Governance, and Auditing.

Songsheng Chen, Director, Prof., Department of Accounting, School of Management & Economics, Beijing Institute of Technology, Beijing, China. He has published his papers in Journal of Information System, Asia-Pacific Journal of Accounting and Economics, Journal of International Accounting Research, and Journal of Emerging Technology in Accounting. His research interests include Auditing, Compensation, Accounting Information System, and Meta-analytical Accounting Research.

Bushra Komal, Doctoral student, Department of Accounting, Business School, University of International Business and Economics, Beijing, China. His research interests include Meta-analytical Accounting Research, Financial Accounting, Corporate Governance, and Auditing.

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