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Article

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ACCOUNTING, CORPORATE GOVERNANCE & BUSINESS ETHICS | RESEARCH ARTICLE

Audit pricing puzzle: Do audit firm industry specialization and audit report lag matter?

Ebenezer Nana Yeboah¹, Bismark Addai^{2*} and Kingsley Opoku Appiah³

Abstract: This study examines whether audit firm industry specialization and audit report time lag (ARL) matter in the audit fees puzzle. Specifically, we examine the moderating effect of audit time lag on the audit firm industry specialization and audit fees nexus. We use dataset from 100 quoted and unquoted Ghanaian firms from 2008 to 2018. We find that audit firm industry specialization exhibits a significant positive impact on audit fees and a significant negative effect on ARL. The results of the interaction between audit firm industry specialization and ARL also display a negative association with audit fee, signifying that specialization significantly reduces audit fee premium paid provided these experts produce the financial report in a short time. Further analysis on large and small companies, state-owned and private companies, weak and strong internal controls also indicate the significance of audit firm industry specialization and reporting time lag in explaining audit pricing puzzle. The novelty aspect of this study is the analysis of the moderation effect of audit timeliness on the audit firm industry specialization and audit fees nexus in the context of a lax enforcement of Generally Accepted Accounting Principles environment.

Subjects: Business, Management and Accounting; Financial Accounting; International Accounting

Keywords: audit market concentration; audit fees; audit report time lag; industry knowledge; industry experience

1. Introduction

The pricing of audit of firms in both developed and developing economies has received renewed interest in both the financial, regulatory and the academic press, due in part to the Enron-Arthur Andersen, KPMG-Guptas, KPMG-Ted Baker, Grant Thornton-Patisseries Valerie Scandals. These scandals that took place in the last two decades were the worst accounting scandals in history (Petra & Spieler, 2020). In an attempt to answer the audit pricing puzzle, prior research focuses on auditor size (Evana et al., 2019), competition (H. Chen et al., 2019), board characteristics (Carcello et al., 2002), audit committee characteristics (Abbott, Parker, Peters and Raghunandan, 2003), discretionary accounting accruals, and managerial incentives (Gul et al., 2003) and audit fees. Others have argued that, in addition to audit firm size, board composition, characteristics and structure matter (see Abbott, Parker, Peters and Raghunandan, 2003; Carcello et al., 2002; Ittonen et al., 2010; Zaman et al., 2011). Carcello et al. (2002), for instance, document that a more independent, diligent, and expert board may protect their reputation capital by demanding more audit work. More audit work is linked to higher audit quality and cost to client (Carcello et al., 2002). Extending this notion, other studies have explored whether abnormally high audit fees

impair audit quality (Choi et al., 2010). Contemporary scholars consider audit fees and Auditor's gender (Ittonen & Peni, 2012), social capital (Jha & Chen, 2015), and companies' political connections (Salehi, 2020). Salehi (2020) documents that the political affiliations of a firm display a significant and inverse effect on the link between institutional ownership and auditing fee and abnormal audit fees.

Another stream of studies argued that audit fees is a function of auditor's industry specialization and/or audit report lag (see Abidin & Ahmad-Zaluki, 2012; Badawy & Aly, 2018; Zerni, 2012). An increase in the portfolio of public, large, complex, high-profile clientele base enhances the audit staff and senior partners' specialized knowledge and expertise related to generally acceptable accounting standards of these entities (Zerni, 2012). These, in turn, guarantee higher audit quality, and in this way, reduce litigation risks associated auditing these risky clients. Again, the accumulation of knowledge and expertise from a specialized industry by the auditor impacts positively on the valuable reputational capital of the audit firm (Badawy & Aly, 2018). Accordingly, these high-profile audit firms, with valuable reputational capital, are more likely to reduce revenue dependence on aggressive financial reporting clients. Put differently, audit firm industry specialization equipped the auditors with the required experience, expertise and skills (see, Solomon et al., 1999; Zerni, 2012) for superior performance (Libby & Tan, 1994; Ramsay, 1994; Tan & Jamal, 2001) including resolving complex financial reporting issues among clients (see Johnstone, Bedard, and Biggs 2002) by demanding a more conservatism and high-quality financial statements (Johnstone et al., 2001). In sum, higher quality financial report and audit is a function of audit partner industry specialization (Chi & Chin, 2011; Chin & Chi, 2009). Evidence (e.g., Balsam et al., 2003) supports this notion, highlighting that higher earnings quality is associated with clients audited by industry-specialist audit firms but not clients audited by non-specialists. Prior empirical evidence on audit firm industry specialization and audit fees is unclear. The supply side view is that audit firm specialization, proxied by audit expertise and auditor-perceived risk factors, is crucial in audit effort and pricing (see Landsman, and Shackelford 2001; F. A. Gul & Goodwin, 2010; Causholli et al., 2010; Eldeeb & Hegazy, 2016; Johnstone & Bedard, 2001, 2003). From the demand-side perspective, evidence (e.g., Abbott, Parker, Peters and Raghunandan 2003; Carcello et al., 2002; Hay et al., 2006) suggests that outside directors pay higher audit fees by demanding high-quality audits. This view is reiterated by Zerni's (2012) findings, highlighting that corporate insider price the audit services of industry specialist audit partners 10.8 to 15.4 percent more as compared to non-specialist audit partners. Further analysis suggests that higher fees (12.4% vs 8%) are earned by engagement industry specialist audit partners compared to public firm industry specialists (see, also Craswell et al., 1995; Nagy, 2014; Scott & Gist, 2013). A clear implication of these articles is that audit firm industry specialization is differentiation strategy to acquire expertise by audit firms to attract a higher fee premium. An opposing view is that an audit partner's industry firm specialization is not necessarily attracting higher audit fee premium (Ambrosini & Bowman, 2001). Here, a transfer of auditor production efficiency, due in part to auditor industry specialization, to clients may result in a discounted audit fee. Evidence from Casterella et al. (2004) supports this notion, highlighting an inverse association between industry specialization and audit fees. In fact, Blouin et al. (2007) and Fukukawa and Karube (2013) document that former clients of Arthur Andersen enjoyed reduced audit fees by switching to auditors with client-specific knowledge and experience (see, also Benkard, 2000). These findings are consistent with the learning curve theory, suggesting that transfer of audit industry specialization guarantees a reduction in both audit effort and pricing. Critics, however, argue that industry expertise is not subconsciously understood and applied and also not easily transferred, implying its effects on audit fees remains an empirical question.

Our study adds to this line of research by examining the moderation effect of audit time lag on the audit firm industry specialization and audit fees nexus. Owusu-Ansah (2000) argued that timely publication of financial statements is crucial to reduce information asymmetry and vital for a well-functioning capital market. However, the delay in release of financial statements increases investment decision uncertainties. Several studies in both private and public firms to assess the determinants of audit report timeliness have concluded Big Four auditors can improve reporting timeliness.

Conversely, the role of industry specialist auditors to improve audit report time lag remains under consideration. Due to limited financial report availability beyond the financial statements, the timely publication of these financial statements in an emerging market is vital to ensure a constant flow of capital. However, as required by regulations and laws, a company can only release financial statements verified by its external auditors. Consequently, the timely publication of financial statement is dependent on the work pace of the auditors. Evidence shows that audit firm industry specialization impacts firms' audit delay (Habib & Bhuiyan, 2011). Employing two audit firm industry specialization measures, the authors found that firms being audited by industry specialists have shorter ARL. Furthermore, all firms (except those audited by industry specialists) experienced an increase in ARL after adopting the International Financial Reporting Standards (IFRS).

Our contribution is twofold. First, our evidence suggests that audit firm industry specialization is linked to higher fees but reduced audit report lag, in an environment with lax enforcement of generally accepted accounting principles. Second, we document that client in these lax environments may also benefit from reduced audit fees, provided their audit firm with expertise produce report in a short time. The rest of the paper proceeds as follows. Section 2 and 3 present the structure of audit firms in Ghana and the review of relevant literature, respectively. Section 4 details the research methodology and data description. Section 5 contains the empirical analysis while Section 6 concludes the study.

2. The structure of audit firms in Ghana

Ghana Companies Act 2019, Act 992, prescribes relevant issues surrounding the auditor engagement in Sections 137 to 143. Section 138 focuses on appointment of auditors, emphasizing that the major requirement for appointment of both private and public companies is membership and licensed by the relevant Act of Chartered Accountants Ghana. Deloitte, PricewaterhouseCoopers (PwC), KPMG, and EY are the four largest professional services firms (hereafter Big Four) in Ghana that provide audit, transaction advisory, taxation, consulting, risk advisory, and actuarial services. The Big Four perform audits on the majority of public companies and private companies throughout Ghana. The Accountancy Practice Review Committee is mandated by the Institute of Chartered Accountant Ghana Act 2020, Act 1058, to monitor and evaluate compliance to standard by audit firms in Ghana. Section 140 also addresses the remuneration of the auditor, highlighting that remuneration of an auditor includes reimbursement of monies paid on behalf of the company. The Guidelines on Auditors of Public Companies and SEC Licensees (2020) concur and also provide additional appointment requirements and restrictions on the Auditor. These include avoiding financial reporting duties of existing audit clients and also not be disqualified under the Securities Industry Act, 2016 (Act 929).

Further, the ICAG requires audit reports to be signed personally by the Auditor in charge. The auditor must also attach his practicing number and the name of the audit firm. The International Standards on Auditing (ISA) 700 "Forming an Opinion and Reporting on Financial Statements" prescribes that "The auditor's signature is either in the name of the audit firm, the personal name of the auditor or both, as appropriate for the particular jurisdiction. In addition to the auditor's signature, in certain jurisdictions, the auditor may be required to declare in the auditor's report, the auditor's professional accountancy designation or the fact that the auditor or firm, as appropriate, has been recognized by the appropriate licensing authority in that jurisdiction", is relevant here. The Security Exchange Commission did not only endorse the ICAG pronouncement in line with ISA 700 but also required enforcement by other members including the Bank of Ghana and National Insurance Commission. Finally, section 136(1d) mandates the directors to disclose the audit fees, while Section 139 (11) prescribes six years for both appointment tenure and subsequent cooling off.

3. Literature review and research hypothesis

3.1. Audit firm industry specialization

According to Arens et al. (2011), "Auditor specialization is auditor as having deep understanding (knowledge) and long experiences of the client's specific business and industry, having knowledge

about the company's operations, and specific accounting and auditing guidance which are essential for doing a high-quality audit. The nature of the client's business and industry affects clients' business risk and the risk of material misstatements in the financial statements". Tuanakotta (2011) and Cohan et al. (2010) defined audit firm industry specialization as: "Industry Specialist Auditor having long experiences and deep understandings of how general and specific accounting guidance applies to the specific client's industry and includes understanding of operational challenges and nuances of such industry.

According to the existing literature on audit firm industry specialization, there are many different expressions about the definition of audit firm industry specialization, but there is no difference in principle in these expressions, and the content of the expressions are consistent. Based on certified public accountant's industry specialization, audit firms that focus on a particular industry, and accumulate industry knowledge which are obviously different from other audit firms, will gradually become experts in that industry. Industry specialization is a kind of business strategy and market competition strategy adopted by audit firms based on their emphasis on specific industry knowledge and industry audit experience.

3.1.1. Industry knowledge

DeAngelo (1981) asserts that the Knowledge used by certified public accountants in the auditing process includes: (1) General Knowledge, that is, the Knowledge applicable to the auditing of all clients;(2) Industry-specific Knowledge, that is, Knowledge applicable to auditing customers in Specific industries;(3) Client-specific Knowledge, that is, Knowledge only applicable to audit Specific clients. General accounting and auditing knowledge are not sufficient to identify all material misstatements, as such industry-specific knowledge is considered more important for identifying these material misstatements. Panjaitan and Chariri (2014) argue that auditors with industry specialization have better knowledge and understanding of the client's business characteristics compared to auditors with no industry specialization. ISA315 clearly states that certified public accountants need to have a full understanding of the relevant industry, regulatory and other external factors, including the applicable financial reporting framework. The key industry knowledge required for audit firms with industry specialization mainly includes the following:(1) the basic characteristics of the industry, such as production technology, technological process, transaction process, seasonality and periodicity of production and operation;(2) Key indicators and statistical data of the industry, such as market demand and total production capacity of the industry, input and output rate of products, market price and change trend of products, gross margin, etc., and market share and competitive position of customers related thereto;(3) Industry-specific accounting standards, accounting systems and industry-specific practices, such as special accounting practices and information disclosure requirements for finance, insurance, agriculture and other industries;(4) and related important legal and regulatory environment, such as the national important regulations and standards for the industry, such as environmental protection regulations, "food safety law", the promulgation of the coal enterprise safety production license, core capital adequacy ratio of a financial enterprise, need tested for monopoly enterprise market concentration and return on sales, etc.:(5) Changes in the business environment of the industry at home and abroad, such as the promulgation of new environmental laws and regulations, and the implementation of foreign exchange control and trade protectionism by important trade destinations of export-oriented enterprises. Audit firms should master the above basic knowledge of the client's industry and make it an essential professional quality.

3.1.2. Industry audit experience

Wright (1997) believes that there are various kinds of Experience, including:(1) General Domain Experience;(2) Task-specific Experience;(3) Industry Experience. General experience and experience in specific tasks are the prerequisites for certified public accountants to engage in audit work. In the process of audit, specific industry audit experience has an important impact on the CPA's ability to evaluate the acceptability of clients, develop audit plans, assess risks, respond to risks, and issue appropriate audit reports. The important value of industry audit experience is firstly

reflected in the acceptability evaluation of clients in the business commission stage. In the business commission stage, audit firms master the normal and average economic indicators of the customer industry and the changes of the domestic and foreign business environment. This is helpful to analyze the enterprise's going concerns and high-risk areas, so as to avoid signing risky contracts. Secondly, in the stage of making audit plan, industry audit experience is helpful for certified public accountants to make overall audit strategy and specific audit plan. It has been demonstrated that auditors with industry specialization provide higher audit quality. Thirdly, in the risk assessment stage, industry-specific auditing experience helps certified public accountants to better evaluate the financial statement level of clients and identify the level of material misstatement risk. The International Standards on Auditing (ISA) underlines risks that exist in a firm's environment (Lennartsson, 2011). Auditors with industry specialization have long experiences and deep understandings of how general and specific accounting guidance applies to the specific client's industry. This includes understanding of operational challenges and nuances of such industry. In addition, in control testing and substantive procedures, industry audit experience helps to better identify areas of material misstatement in financial statements. Ishak et al. (2015) opine that specialist auditors influence audit quality because specialist auditors are more likely to detect errors and irregularities due to their level of experience in the industry.

3.2. Research hypotheses

There are two opposing theories that explain the relationship between audit fees and audit industry specialization. One is related to audit quality, which explains fee premiums based on quality-differentiated services provided by auditors. Audit quality is related to firm size. The argument is that large audit firms are more likely to be independent because they receive a smaller percentage of total firm revenues from a given client. This implies that large audit firms could be quality-differentiated. Auditors with expertise in information processing and knowledge of industry conditions are more likely to provide quality-differentiated services to reduce information risk. The audit firm will charge premium on audit fees as a result of high-quality audit service and the client needs. Also, when client chooses an audit firm with industry expertise it is willing to pay higher audit fees.

Audit firms can invest in developing industry expertise, establishing reputation, and differentiating themselves from other industry non-specialists by providing quality differentiated services. First, the proprietary industry knowledge used by the audit firm, which helps the firm understand the business activities in the specific industry where the client is located better. The second is the proprietary auditing skills that audit firms have formed for a long time. This skill helps audit firms provide their clients with solutions (accounting methods and other methods) related to industry problems faced by their clients. The third is the proprietary non-audit skills acquired from clients that provide audit services. These skills help audit firms provide value-added services for their clients' business activities. Fourth, the firm has relevant knowledge of the client's industry, which can reduce communication costs with the auditor. Fifth, it's a signal to show high-quality financial statements to the market when the client employs an industry specialist audit firm. As a result, they may then charge a fee premium reflecting return to investment in industry expertise, which is consistent with economic theory of product differentiation. The client is willing to pay for this an audit firm that successfully differentiates itself will gain bargaining power with clients who demand the correspondingly higher quality services. Clients simply will not have an alternative of the same quality level. An audit firm that can separate itself from competitors will gain cost advantages as its market share increases. However, clients will be able to bargain for a portion of the cost savings by threatening to utilize another audit firm with a similar market share (Mayhew & Wilkins, 2003). That is, auditors with similar market shares will have similar quality services and will be forced to share their cost benefits with clients due to price competition. Alternatively, when an audit firm can stay ahead of its competitors by enhancing its relative value proposition, it will be able to retain its cost savings and possibly charge a premium for its services. The development of industry expertise by audit firms is to enhance their value and differentiate them from other firms. In above, industry specialist audit firm might charge higher audit fees based on expertise.

The other theory of the effect of industry specialization on audit fees is based on economies of scale, which explains audit fee discounts from auditors' operating efficiencies (DeFond et al., 2000). Scale economies occur in the range of output where lowest average costs are attained. Audit firms with a higher market share can allocate industry-specific investment costs to more customers in the industry, and thus have a low-cost advantage. Such audit firms gain a competitive advantage by charging customers lower audit fees. The audit fees for industry specialists with high market share may be less due to investment in industry-specific knowledge related to the regulatory environment. Industry specialists may charge a fee premium, particularly different industries may attract different fees where the fee premium may be less or more likely to be offset by scale economies. A feasible explanation for why clients choose specialists is that specialist auditors experience economies of scale in auditing clients in the industries of expertise and may pass a portion of these economies to their client firms. In this case, clients might benefit by hiring a specialist auditor without paying a fee premium and could enjoy a fee discount. Wang et al. (2009) studied audit fees' determinants by focusing on auditor industry specialization and second-tier auditors in the Chinese market. The study found evidence of Big 4 premiums for brand name and industry specialization in both the supplementary and statutory market. Big 4 industry specialists charge extra premiums in the statutory market in comparison to non-industry specialists. The study also found out that market expansion did not provide the second-tier auditors any price advantage. These auditors increased their market share mainly in the mid- and small-sized clienteles. Moreover, the second-tier firms' industry experience may have facilitated attaining economies of scale and reducing service fees. This may be their strategy to gain future clients that can afford low-priced audits. In above, industry specialist audit firm might charge lower audit fees based on scale economies. The discussion above enabled the researcher to develop the hypothesis:

H_{1a}: All other things being equal, industry specialist audit firm will charge higher audit fees based on expertise.

H_{1b}: All other things being equal, industry specialist audit firm will charge lower audit fees based on economies of scale.

Timeliness of corporate annual financial reports is considered a critical and important element affecting the usefulness of information made available to external users. This information is essential for the users to assess the financial strengths and performance of related companies. One of the main aims of corporate reporting is to deliver information that will guide external users in decision-making. However, it is required to be made available within a short period of time from the end of the reporting period; otherwise, it loses some of its economic value (Al-Ajmi, 2008). Timeliness becomes one of the most important elements of financial accounting information quality for the accounting profession (Soltani, 2002). Timeliness can also be viewed as a way of reducing information asymmetry by improving the pricing of securities, mitigating insider trading, and reducing the opportunity to spread rumors about the companies' financial health performance. However, as required by laws and regulations, a company can only release financial statements after verification by the external auditor. Consequently, the release of financial statements to the users is significantly determined by the auditors.

Some studies highlighted that audit firms with industry specialization are more reliable and highly qualified to minimize delay (Afify, 2009; Ahmed & Hossain, 2010; Modugu et al., 2012; Mohamad Naimi et al., 2010; Owusu-Ansah & Leventis, 2006). In addition, several empirical studies have emphasized the prevalence of a significant relationship between timeliness and audit firm expertise measured by longer auditor-client tenure (Habib & Bhuiyan, 2011; Pizzini et al., 2015; Wan-Hussin & Bamahros, 2013), since an auditor can save time by the experience they obtained over this period. Further studies illustrate that audit report lag is shorter for firms audited by

industry specialist auditors. They develop industry-specific knowledge and expertise and familiarize themselves quickly with the clients' business operations. Therefore, they are likely to complete the audit sooner than their non-specialist counterparts (Habib & Bhuiyan, 2011). Sakka & Jarboui (2016) examined the relationship between corporate governance, external auditor's characteristics index, and timeliness in light of the recent amendments to the Financial Security Law (2005) in Tunisia. This study concluded that the good governance structures play a key role in improving the quality of timeliness of financial reports. As for the empirical tests, they indicated that the audit report publication date proves to be earlier, the external auditor is from a specialized firm. Habib and Bhuiyan (2011) contributed to the audit report lag (ARL) literature by documenting the association between audit firm industry specialization and the ARL. Utilizing regression analyses with two different industry specialization descriptions and controlling for known determinants of ARL, they elaborated that the ARL is shorter for firms audited by industry specialist auditors. Findings also revealed that the adoption of International Financial Reporting Standards (IFRS) has increased the ARL for all auditors except for industry specialist auditors. (Chen, 2001) investigated whether the effect of industry specialization on audit fees depends on industry regulation and narrower market definitions. Two regulated industries (SIC 131 and SIC 602) and two non-regulated industries (SIC 357 and SIC 581) were selected for testing. Specialists in non-regulated industries were expected to charge higher fees than specialists in regulated industries, because scale economies are more likely in regulated industries. The results were consistent with specialists in non-regulated industries being able to charge higher audit fees. Specialist fee effects were not greater using narrower state and regional market share measures of specialization.

We suppose that audit firms with industry specialization are more capable to complete the auditing mission and timely disclosure. In above, industry specialist audit firm might spend less time on disclosing financial report based on expertise.

The discussion above enabled the researcher to develop the hypothesis:

H₂: All other things being equal, industry specialist audit firm will result in a shorter ARL.

Prior research documents that industry-specialized auditors have more expertise and experience in detecting errors within their specialization (Owhoso et al., 2002). Industry-specialist auditors have the capacity to gain industry-specific knowledge and expertise to acquaint themselves quickly with the clients' business operations and, therefore, are likely to complete the audit earlier than non-specialist counterparts. In addition, industry-specialized auditors have more access to technologies, physical facilities, personnel, and organizational control systems, which result in high audit efficiency and audit quality. Habib and Bhuiyan (2011) found out that audit industry specialization is correlated to higher audit efficiency. Meanwhile, short audit reporting timeliness with audit expertise is predicted to lead to lower audit fees. Given prior research on the impact of audit industry specialization, it is reasonable to believe that audit industry specialization can reduce the audit fees resulting from auditors having expertise in auditing clients and having the tendency to conduct the audit more quickly. In summary, audit firms with industry specialization charge high audit fees due to their expertise. However, when timeliness is considered, which moderates the impact of audit industry specialization on audit fees. Though the specialized firms charge premium, their level of efficiency will in turn reduce the number of days that are spent on an audit. With the number of audit days spent on an audit being one of the major components in determining audit fees, the less time spent on an audit by a specialist will reduce the premium charged. As such, the impact of audit industry specialization on audit fees is moderated by timeliness. Thus, the researcher hypothesizes that:

H₃: All other things being equal, the interaction between industry specialist audit firm and audit time lag will reduce audit fees.

4. Research method and data

4.1. Data and sampling

The target sample of the study consists of all registered companies (both listed and unlisted firms) in Ghana as at the end of 2019. The initial plan was to conduct the research on all companies in Ghana given the accounting specialization focus of this study. However, this was not possible due to the non-availability of firm-level data for some companies.

According to Denscombe (2003), it is virtually unattainable for a researcher to gather all categories of objects being studied. Miles and Huberman (2002) also succumbed to the impossibility of gathering data on all the objects of interest by stating that it is not possible to study everyone everywhere and do everything when conducting a research. Thus, a researcher must make an effort to obtain evidence from a section of the population through a sampling technique. The researcher began the data search on all registered companies in Ghana. Nevertheless, the initial search for data on all registered companies in Ghana was not successful due to the non-availability of data on some of the companies, so the researcher had to eliminate companies during the initial data search. After a careful and detailed examination of the available data from the Ghana stock exchange and websites of the registered companies, the researcher settled on one hundred registered companies for a period of eleven years. The 100 companies include all the 37 listed companies on the Ghana stock exchange while the remaining 63 companies are unlisted companies. The sample includes companies across banking, insurance, and manufacturing aluminum and mining industries.

4.2. The measure of audit firm industry specialization

As industry specialization is not directly observable, prior studies use several proxies (e.g., market share and portfolio share) to measure it. Most measures are based on a firm's market share because industry expertise is obtained by repetition of the audit task in similar settings. Therefore, the public perceives that auditing a large share of a certain industry implies expertise (Balsam et al., 2003). Palmrose (1986) identifies industry specialists as "the largest supplier in each industry, as well as the second- and third-largest suppliers in industries in which readily observable differences exist between the second and the third or between the third and the remaining suppliers." In this study, industry specialization is measured by the market share approach using total assets as the base. This approach assumes that by comparing the relative market shares of the audit firms in an industry, industry-specific knowledge can be gathered. The firm with the largest market share has the most knowledge about that industry, so in this study the audit firm with the largest market share is indicated as the industry specialist. The audit firm market share is calculated as follows:

$$MS_{ik} = \frac{\sum_{j=1}^{J_k} \sqrt{A_{ijk}}}{\sum_{i=1}^{I_k} \sum_{j=1}^{J_k} \sqrt{A_{ijk}}} \quad (1)$$

Where MS represents market share of by auditor i in industry k ; A_{ijk} is the total assets of client firm j in industry k audited by auditor i ; $i = 1, 2 \dots I$ = an index for audit firms; $j = 1, 2 \dots J$ = an index for client firms; $k = 1, 2 \dots K$ = an index for client industries; ik = the number of audit firms i in industry k ; ijk = the number of clients served by audit firm i in industry k . An audit firm that has the greatest market share in a given industry in a given year takes a value of 1 and otherwise, 0. For this study, the companies were selected across banking, insurance, and manufacturing aluminum and mining industries.

This study adopted the assets base market share model as the main measure for industry specialization and two alternate specialization measures: revenue-based market share and auditor fraction based (fraction of firms audited by total firms in the industry). For the main measure of

specialization, SPEC, an audit firm that has the greatest market share in a given industry in a given year takes a value of 1 and otherwise, 0.

4.3. The empirical models

With reference to standard audit fee model (Craswell & Francis, 1999; C. J. Chen et al., 2007; Mayhew & Wilkins, 2003), the researcher examines the effect of audit firm industry specialization by employing audit fees as the main dependent variable and audit firm industry specialization as the main independent variable after controlling for the effects of client size, audit complexity, and auditor–client risk sharing, profitability, and audit lag. This is used to test the effect of audit firm industry specialization on differential audit pricing based on the hypotheses, experimental variables for Big 4 firms, and industry specialists are added to the audit fee model. We estimate the OLS regression model as follows:

$$\begin{aligned} FEE_{it} = & \beta_0 + \beta_1 SPEC_{it} + \beta_2 SIZE_{it} + \beta_3 ROA_{it} \\ & + \beta_4 LEV_{it} + \beta_5 OPR_{it} + \beta_6 CFO_{it} + \beta_7 REC_{it} \\ & + \beta_8 BIG4_{it} + \beta_9 LOSS_{it} + \gamma_j + \tau_t + \varepsilon_{it} \end{aligned} \quad (2)$$

where FEE represents natural log of audit fees paid by the clients. SPEC represents audit firm industry specialization which is the main independent variable already explained. SIZE is the natural log of total assets, ROA is the profit before tax scaled by average assets, LEV is leverage calculated as the ratio of long-term liabilities and total assets, OPR is the client operation risk which is directly measured by efficiency ratio as operating cost divided by total revenue. CFO is the change in operating cashflow scaled by total assets. LOSS is an indicator variable which takes the value of 1 if loss reported in current year, and 0 if otherwise and BIG4 is also an indicator variable which takes a value of 1 if a Big 4 audit firm is used, and 0 if otherwise. REC represents receivables estimated as total receivables scaled by total assets; γ_j and τ_t are the industry and year effects.

The next model links audit firm industry specialization to audit report timeliness (ARL), one of the readily observable audit output variables. Lee et al. (2009) indicate that research on the determinants of the ARL is important because (i) the ARL affects the timeliness of both earnings and audit information; and (ii) clear understanding of what factors influence the ARL is likely to provide more insights into audit efficiency. Several research on the determinants of the ARL have been conducted globally including New Zealand (Walker & Hay, 2007); the US (Knechel & Payne, 2001; Lee et al., 2009); France (Soltani, 2002); Egypt (Afify, 2009); and Greece (Leventis et al., 2005).

Taken together, extant research on the determinants of the ARL has identified a number of explanatory variables relevant to the ARL. This model follows the same logic and enriches the ARL literature by integrating auditor industry specialization as a possible determinant of the ARL. Industry expertise would be expected to produce shorter ARLs due to the shorter time needed for industry-focused auditors to familiarized themselves with clients' financial reporting systems. Additionally, industry specialist auditors can resolve complex accounting problems faster than their non-specialist counterparts due to their in-depth industry-focused knowledge. Also, it allows the specialist auditors to complete audit reports sooner than the non-specialists. The following regressions were performed to estimate the effect of audit firm industry specialization and financial reporting timeliness.

$$\begin{aligned} ARL_{it} = & \beta_0 + \beta_1 SPEC_{it} + \beta_2 SIZE_{it} + \beta_3 ROA_{it} \\ & + \beta_4 LEV_{it} + \beta_5 OPR_{it} + \beta_6 GROWTH_{it} \\ & + \beta_7 BIG4_{it} + \beta_8 LOSS_{it} + \gamma_j + \tau_t + \varepsilon_{it} \end{aligned} \quad (3)$$

where ARL represents the natural log of audit days used by audit firms to audit the financial statement of the firms in the whole sample, banks, and manufacturing firms, respectively. SPEC represents audit firm industry specialization which is the main independent variable already explained in chapter three of this study. SIZE is the natural log of total assets, ROA is the profit

before tax scaled by average assets, LEV is leverage calculated as the ratio of long-term liabilities and total assets, OPR is the client operation risk which is directly measured by efficiency ratio as operating cost divided by total revenue, GROWTH is the expansion of the firm measured by the change in total assets. LOSS is an indicator variable which takes the value of 1 if loss reported in current year, and 0 if otherwise and BIG4 is also an indicator variable which takes a value of 1 if a Big 4 audit firm is used, and 0 if otherwise; γ_j and τ_t are the industry and year effects.

We further examine how audit report time lag (ARL) moderates the accounting specialization impact on audit fees by introducing into the audit fee model in Equation (2), audit report time lag and a cross term, Specialization*audit report time lag (SPEC*ARL). The inclusion of the cross terms in the audit fee model is expressed as follows:

$$\begin{aligned}
 FEE_{it} = & \beta_0 + \beta_1 SPEC_{it} + \beta_2 ARL_{it} + \beta_3 SPEC * ARL_{it} \\
 & + \beta_4 SIZE_{it} + \beta_5 ROA_{it} + \beta_6 LEV_{it} + \beta_7 OPR_{it} \\
 & + \beta_8 CFO_{it} + \beta_9 REC_{it} + \beta_{10} BIG4_{it} + \beta_{11} LOSS_{it} + \gamma_j + \tau_t + \epsilon_{it}
 \end{aligned}
 \tag{4}$$

5. Results and discussions

5.1. Descriptive analysis

Table 1 displays the descriptive statistics of the sample including the mean scores and the standard deviation of each variable. One key variable in Table 1 is the natural logarithm of audit fees. The actual audit fees data shows an average audit fee of GHC 146,655.60 with a minimum value of 4,000 and a maximum of GHC696,000 over the 11-year period. Another variable of interest in Specialization (SPEC) with a mean of 0.271 and a standard deviation of 0.114. Similarly, total assets (SIZE) an average of 18.982 and a standard deviation of 2.414.

Profit before tax (ROA) has a mean value of 0.008 and a standard deviation of 0.407 with maximum value of 0.715 and minimum value of -5.649. For leverage (LEV), it has a mean of 0.765 and standard deviation of 0.001 and the mean is higher than the median of 0.628. OPR (client operation risk) is averagely 0.348 and a standard deviation of 1.076 and median of 0.351.

Table 1. Descriptive statistics

| Variable | Obs | Mean | Median | Std. Dev. | Min | Max |
|----------|-------|--------|--------|-----------|---------|--------|
| FEE | 1,100 | 11.572 | 11.487 | 1.084 | 8.294 | 13.453 |
| SPEC | 1,100 | 0.271 | 0 | 0.114 | 0 | 1 |
| SIZE | 1,100 | 18.982 | 22.153 | 2.414 | 12.686 | 23.087 |
| ROA | 1,100 | 0.008 | 0.043 | 0.407 | -5.649 | 0.715 |
| LEV | 1,100 | 0.765 | 0.628 | 1.218 | 0.001 | 21.126 |
| OPR | 1,100 | 0.348 | 0.251 | 1.076 | 4.145 | 9.724 |
| CFO | 1,100 | 4.931 | 0.307 | 9.216 | -8.8606 | 8.634 |
| REC | 1,100 | 1.616 | 0.108 | 0.464 | 0.030 | 7.063 |
| ARL | 1,100 | 4.446 | 4.466 | 0.464 | 3.555 | 11.063 |
| GROWTH | 1,100 | 0.256 | 0.114 | 0.461 | -0.847 | 5.754 |
| BIG4 | 1,100 | 0.835 | 1 | 0.372 | 0 | 1 |
| LOSS | 1,100 | 0.171 | 0 | 0.377 | 0 | 1 |

Note: Table 1 reports the descriptive statistics of the study variables. FEE represents audit fee, SPEC represents audit firm industry specialization, SIZE is the natural log of total assets, ROA is the profit before tax scaled by average assets, LEV is leverage, OPR is the client operation risk, CFO is the change in operating cashflow scaled by total assets. Growth indicates firm growth, LOSS is an indicator variable which takes the value of 1 if loss reported in current year, and 0 if otherwise and BIG4 is also an indicator variable which take a value of 1 if a Big 4 audit firm is used, and 0 if otherwise, and REC represents receivables.

Audit reporting lag (ARL) has a mean of 4.446 and standard deviation of 0.464. The results show a maximum of 11.063 and 3.555 for minimum value. On average most audit reports exceed the expected reporting time of 90 days in Ghana. The expansion of the firm measured by the change in total assets (GROWTH) has a mean of 0.256 and standard deviation of 0.461. The results show a maximum of 5.754 and -0.847 for minimum value. The indicator variable BIG4 has a mean of 0.835 and an SD of 0.372. The indicator value LOSS has a mean of 0.171 and an SD of 0.377 which edges closer to the minimum mean (0) than the maximum mean (1).

Table 2 displays the univariate test results for the mean differences between the companies using accounting specialists and non-specialists. From the table, the difference between the fees charged by specialist and non-specialist is -0.342^{**} which is statistically significant. The results also show that there is a positive relationship between audit industry specialization and audit fees for both specialized and non-specialized. The significant difference indicates that there is premium charge by audit firms with industry specialization.

Companies with higher profit before tax (ROA) are very specific on the type of auditor they choose to hire to audit them. This is indicated by statistically significant value of -0.042^* . This means the higher the profit is, the more likely they would go in for a specialist are and vice versa. The table also shows that the difference between the audit report lag (ARL) for firms audited by specialist and non-specialist is 0.069^{**} which is statistically significant. The significant ARL difference implies that the time taken to complete audit by specialist is significantly less than the time taken by non-specialist to complete auditing task for clients.

Leverage (LEV), the results show that it plays no significant role statistically (0.131) in the type of auditor chosen by a company in auditing their accounts though they prefer non-specialist. Based on client operation risk (OPR), the difference in the type of auditor they choose to engage in auditing their accounts is statistically significant (0.018^{***}). In most instances they prefer to go for non-specialist. For Receivables (REC), the difference in their choice of auditors is statistically significant (-0.038^{**}). On the whole, companies with higher receivables prefer to use specialist. When it comes to indicator variable (BIG4), most firms prefer specialist giving a statistically significant value of -0.205^{***} .

5.2. Correlation analysis

The correlation coefficients as displayed in the correlation matrix in Table 3 show that the variables in the model for the effect of audit firm specialization on audit fee is free from the problem of

Table 2. Univariate test

| Variable | Non-specialist | Specialist | Mean difference |
|----------|----------------|------------|-----------------|
| FEE | 11.576 | 11.917 | -0.342^{**} |
| ARL | 4.469 | 4.400 | 0.069^{**} |
| SIZE | 19.467 | 19.968 | -0.501 |
| ROA | -0.021 | 0.021 | -0.042^* |
| LEV | 0.891 | 0.760 | 0.131 |
| OPR | 0.401 | 0.382 | 0.018^{***} |
| CFO | 4.213 | 4.934 | -0.720 |
| REC | 0.140 | 0.178 | -0.038^{**} |
| BIG4 | 0.772 | 0.977 | -0.205^{***} |
| GROWTH | 0.203 | 0.216 | -0.013 |
| LOSS | 0.180 | 0.269 | -0.089 |

Note: Table 2 reports the univariate test between firms using specialist and those using non-specialist audit firms. *** indicates $p < 0.01$, ** indicates $p < 0.05$, while * indicates $p < 0.1$. All variables are defined in the note to Table 1.

multicollinearity. From Table 3–4 which shows the correlations among the variables, there is a positive correlation between specialization (SPEC) and fee (FEE). This means that the higher the SPEC is the higher fees (FEE) charged are. For total assets (SIZE) against fees charged (FEE), there was a positive correlation. This translates that, as the assets of the firm being audited are bigger, the fee charged for auditing also increases and vice-versa. The relationship between fees charged (FEE) and profit before tax (ROA) is also positive. This means the higher the profit before tax of the firm or company is the higher the fees charged by the auditor or auditing firm are. When the leverage calculated as the ratio of long-term liabilities and total assets of the company (LEV) is higher, the auditors charge a higher fee (FEE) as given by a positive correlation. The opposite scenario occurs when the situation is vice versa, that is to say, when there is lower leverage (LEV) the fee charged (FEE) is lower. Likewise, the higher the client operation risk (OPR) is, the higher the fee charged (FEE) is. In the same vein, when the client operation risk is low, a lower auditing fee is charged (FEE). Relatively, the more the receivables (REC) are, the more the fees charged (FEE) are and the less the receivables are, the lower the fees charged (FEE) are. This means as the work gets bigger the fees increase on the whole. This was given by a positive correlation.

When a big four audit firm (BIG4) is engaged for the auditing, a higher fee is charged (FEE) as indicated by a positive correlation. However, when the auditing firm is not a Big4 auditing firm then the fee charged (FEE) is lower. If the change in operating cashflow (CFO) is higher, then the fee charged by the audit firm (FEE) is also higher (as given by the correlation). Also, if there is a higher loss (LOSS), the fee charged (FEE) is also higher (given by a correlation and vice versa).

5.3. Regression results

In Table 4, the regression results for the effect of audit firm industry specialization on audit fee and audit report timeliness are presented as Model (1) and Model (2), respectively, while the effect of the cross term, specialization*Audit report lag (SPEC*ARL) is presented as Model (3).

From the second column (Model 1) estimates in Table 4, it can be observed that audit firm industry specialization (SPEC) has a positive impact on audit fees paid which implies that audit firm specialization increases the audit fees paid. The findings show a significant positive association between audit firm specialization and audit fees at 1% level of significance. The outcome also implies that a unit increase in audit firm specialization will result in 4.04 percentage increase in audit fees. The results confirm that the audit market in Ghana charges a premium to companies who demand audit industry specialization. This supports the hypothesis which states that all other things being equal, industry specialist audit firm will charge higher audit fees based on expertise. The result of this study is in line with the study De Fuentes & Sierra (2015), who found out that the influence of audit industry specialization on audit fees is positive and significant. Therefore, assessing the expertise and audit quality measured through audit industry specialization allows audit firms to earn an additional premium, this was also in line with the findings of Hay (2013). The study corroborates with the findings of Nagy (2014) research on the impact of audit partner specialization on audit fees in the US audit market. The findings show significant positive association for both audit industry specialization and audit fees. This suggests that auditor specialization demand a fee premium in the US audit markets.

The principal needs to develop ways of ensuring that their agents act in their interest in agency theory. The conflict of interest among stakeholders of company results in a third party who is the auditor to ensure financial statements are fair and accountable. In some business with complex structures and regulations governing their affairs require an audit firm with industry specialization to produce high-quality audit. The audit firm with industry specialization gives assurance and credible information to solve conflicts of interest between the owner and agent. This occurs due to the possibility that the agent does not always act under the interests of the principal, thereby triggering agency costs. This agency cost as indicated in the results is high due to the engagement of auditor with industry specialization.

Table 3. Correlation analysis

| Variables | FEE | SPEC | SIZE | ROA | LEV | CFO | OPR | ARL | BIG4 | LOSS | GROWTH | REC |
|-----------|----------|----------|-----------|-----------|----------|--------|-----------|-----------|-----------|--------|----------|-------|
| FEE | 1.000 | | | | | | | | | | | |
| SPEC | 0.207*** | 1.000 | | | | | | | | | | |
| SIZE | 0.391*** | 0.205*** | 1.000 | | | | | | | | | |
| ROA | 0.135*** | 0.019 | 0.058* | 1.000 | | | | | | | | |
| LEV | 0.057* | -0.021 | -0.070** | 0.217*** | 1.000 | | | | | | | |
| CFO | 0.024 | 0.023 | 0.027 | 0.019 | 0.009 | 1.000 | | | | | | |
| OPR | 0.028 | 0.032 | 0.096*** | 0.041 | -0.015 | 0.028 | 1.000 | | | | | |
| ARL | 0.245*** | -0.039 | -0.193*** | -0.134*** | 0.003 | 0.005 | -0.025 | 1.000 | | | | |
| BIG4 | 0.426*** | 0.321*** | 0.266*** | 0.121*** | 0.009 | 0.043 | 0.079** | -0.165*** | 1.000 | | | |
| LOSS | 0.237*** | -0.059* | -0.243*** | -0.243*** | -0.007 | -0.051 | -0.081*** | 0.347*** | -0.185*** | 1.000 | | |
| GROWTH | 0.008 | 0.006 | -0.007 | 0.001 | -0.052 | 0.011 | 0.020 | 0.062* | -0.008 | -0.042 | 1.000 | |
| REC | 0.000 | -0.043 | -0.085*** | 0.363*** | 0.316*** | 0.022 | 0.016 | 0.021 | 0.000 | -0.043 | -0.074** | 1.000 |

Note: Table 3 reports the correlation analysis of the study variables. *** indicates $p < 0.01$, ** indicates $p < 0.05$, while * indicates $p < 0.1$. All variables are defined in the note to Table 1.

The Model (1) estimates also reveal that the size of client's company (SIZE) positively influences the amount of audit fees and the effect is statistically significant at 1% level. This indicates that an increase in size will lead to an increase in audit fees. This result is in conformity with the study of Xu (2011); Simon and Taylor (2002) who also found positive impact of firm size on audit fees. Though the profit before tax (ROA) also has a positive impact on audit fees, the effect is statistically insignificant. This implies that an increase in profit before tax will increase audit fees but insignificantly. Prior studies have reported similar results (Cahan & Sun, 2015). When it comes to leverage (LEV), higher leveraged firms are likely to pay higher audit fees and the impact is highly significant. The result is consistent with Reed et al. (2000), Makni et al. (2012), and Fcma et al. (2019). When the client operation risk is high (OPR), a higher audit fee is paid, and the impact is statistically significant. With respect to change in operating cashflow (CFO), as it increases, companies tend to pay more to auditing firms though it is not significant statistically. For receivables (REC), an increase leads to corresponding statistically significant increase in audit fees. The result is consistent with other studies findings, for example, Zerni (2012), Abbott et al. (2003). When it comes to BIG4, there exist a significant positive effect of the Big 4 audit firms on audit fee paid by companies in the study sample. Prior studies have also reported similar results (Fcma et al., 2019; Makni et al., 2012; Yatim et al., 2006). Considering the variable LOSS, when there is a loss companies pay a higher audit fee. This finding is consistent with the study of Antle et al. (2006); Griffin et al. (2010).

It can also be observed from the second column of Table 3–5 (Model 2) that there is a negative relationship between ARL and specialization, which indicates that audit firm industry specialization leads to reduction in the audit report time lag. The results indicate that there is a significant negative relationship between audit time lag and audit industry specialization at 1 percent significant level. This implies that an increase in audit industry specialization will reduce the number of days used to cover and finalize audit. The study results support the hypothesis which states that all other things being equal, industry specialist audit firm will have a shorter audit report lag. The study results are in line with Habib and Bhuiyan (2011) who demonstrated that the audit report lag is shorter for firms audited by industry specialist auditors. Industry-specialist auditors can develop industry-specific knowledge and expertise; and familiarize themselves quickly with the clients' business operations. Therefore, they are likely to complete the audit earlier than their non-specialist counterparts. The findings are in consistent with the study of Abidin and Ahmad-Zaluki (2012) who found out that the potential effect of industry specialist auditors on audit report timeliness.

Again, the estimates for Model (2) also indicate that the log of total assets of company (SIZE), it positively impacts audit report time lag, and the impact is statistically significant. The result is consistent with prior studies such as Apriliane (2015), Arifuddin and Usman (2017), Azizah and Kumalasari (2017), and Noor Sulisty (2010), and Rachmawati (2008). The profit before tax (ROA) negatively impacts audit report lag. The effect is consistently significant across the three measures of specialization. Company with high level of ROA is more quickly in auditing financial statements due to the necessity to bring good news to the public immediately. This result is consistent with the result of Mazkiyani and Handoyo (2017).

Leverage (LEV) is also seen to have a direct effect on audit report timeliness and the effect is statistically significant. This means that more time is needed to audit the accounts of highly leveraged firms. This finding is in agreement with the study of Ettredge et al. (2006). There is also a positive impact of operation risk (OPR) on audit report time lag. This implies that when the client operation risk is high, more time is used in auditing client's financial statements. With respect to the expansion of the firm measured by the change in total assets (GROWTH), for all specialization measures, an expansion (GROWTH) has a direct effect on audit report timelines and the impact is statistically significant. When it comes to variable BIG4 (big 4 auditing firms), it negatively impacts audit report time lag, which means that lesser time is used by these BIG4 in presenting audit reports. Prior studies have also reported the same results, for instance, Alkhatib and Marji (2012); Enofe et al. (2015). Considering the variable LOSS, it also has a significant positive

Table 4. Regression results for the effect of specialization on audit fees and audit report timeliness

| | Audit fee Model (1) | Audit time lag Model (2) | Interactive term Model (3) |
|----------------|----------------------------|---------------------------------|-----------------------------------|
| SPEC | 0.0404*** (0.004) | -0.0205*** (0.002) | 0.4207** (0.041) |
| SIZE | 0.1978*** (0.001) | 0.0131*** (0.004) | 0.1942*** (0.001) |
| ROA | 0.1059 (0.113) | -0.1286** (0.045) | 0.1375 (0.113) |
| LEV | 0.0167*** (0.003) | 0.0044*** (0.001) | 0.0164*** (0.002) |
| OPR | 0.0512** (0.043) | 0.0265*** (0.004) | 0.0488** (0.023) |
| CFO | 0.0001 (0.109) | 0.0003 (0.214) | 0.0000 (1.009) |
| LOSS | 0.2858*** (0.005) | 0.2874*** (0.003) | 0.1972** (0.044) |
| BIG4 | 0.8001*** (0.001) | -0.0793** (0.032) | 0.7789*** (0.002) |
| REC | 0.8943*** (0.006) | 0.1863** (0.042) | 0.8406*** (0.005) |
| GROWTH | | 0.0405*** (0.006) | |
| ARL | | | 0.2734*** (0.009) |
| SPEC*ARL | | | -0.0839* (0.070) |
| Constant | 6.7668*** (0.008) | 4.7415*** (0.009) | 8.0616*** (0.006) |
| Year dummy | Yes | Yes | Yes |
| Industry dummy | Yes | Yes | Yes |
| No. of Obs. | 1,100 | 1,100 | 1,100 |
| R-Squared | 0.8507 | 0.8514 | 0.8506 |

Note: Table 4 reports the regression results for the effect of specialization on audit fees and audit report timeliness. *** indicates $p < 0.01$, ** indicates $p < 0.05$, while * indicates $p < 0.1$. The p-values are in parentheses and all variables are defined in the note to Table 1.

effect on audit report time lag, which indicates that when there is a loss in current year, more time is spent on issuing financial reports. This result is in line with the study of Badawy & Aly (2018); Carlsaw and Kaplan (1991); Habib and Bhuiyan (2011).

For the estimates in Model (3) of Table 4, the results show that the interaction term, specialization*Audit report lag (SPEC*ARL), has a significant negative impact on audit fees. However, compared to the independent effects of SPEC and ARL on audit fees, the magnitude of the impact is reduced for the cross term. Specifically, while specialization and audit report time lag increase audit fees by 42.07% and 27.34%, reactively the cross term (SPEC*ARL) reduces audit fee by 8.39%. The implication here is that although audit report time lag may significantly increase the amount of audit fees charged, when the auditing is done by specialized auditors, these auditors

are able to shorten the audit time to eliminate the magnitude of the audit fee charged due to the time taken to audit accounts.

5.4. Further analysis

We further examine the impact of audit firm specialization across different categories of companies by dividing the sample into large and small companies and state-owned and private companies, and weak internal control and strong internal control. For the division of the sample into large and small companies we used the median of the size of clients' company which is 22.153 shown as part of the descriptive statistics in Table 1. The companies below the median size are the small companies while those above the median are the large companies. The results obtained for the impact of audit firm specialization on reporting timeliness and audit fees for the large and small companies are presented in Table 5. The effect of audit firm industry specialization on audit fee and audit report timeliness are presented as Model (1) and Model (2), respectively, while the effect of the cross term, specialization*Audit report lag (SPEC*ARL) is presented as Model (3).

The further analysis for the large and small firms shows that audit firm industry specialization increases the audit fees paid by companies and reduces the audit report time lag for both large and small firms however the magnitude of impact is higher in smaller firms. By implication, the bigger companies unlike smaller companies are more likely to have adequate resources such as effective audit committee that will help reduce the workload of the specialist auditors. Hence, specialist auditors charge relatively low audit fees for bigger companies due to the fact that less audit time is spent on the audit work than that of the smaller companies.

The sample was also divided into state-owned and private companies to examine the impact of audit firm industry specialization on audit fees and among those categories of companies. The results based on the ownership sub samples (in Table 6) indicate that audit firm industry specialization increases the audit fees paid by companies and reduces the audit report time lag for both state-owned and private companies. However, the magnitude of the impacts on the audit report timeliness are higher on private companies than state-owned companies. This could be attributed to the fact that the private companies employ mostly the specialist audit firms to help reduce the agency problems hinge on asymmetry of information between shareholders and management. Transparency and accountability are very critical when it comes to financial information of private-owned companies because the shareholders have high interest in it. Therefore, private companies employ independent auditors with expertise who in turn charge premium fees to mitigate the financial errors and strengthen the controls. Also, the impact of specialization on audit fee was found to be more significant on state-owned companies though no substantial difference was established between the premiums charged on these two categories of companies.

The study also did a further test based on internal control and the result is presented in Table 7. The companies were grouped into two; companies with weak internal control and those with strong internal control. The division was done based on material misstatement reported in the auditor's report. The result in model 2 (audit fee) is in agreement with the main regression analysis for both companies with weak and strong internal controls. There exists a positive association between the variables indicating that audit firm industry specialization increases the audit fees paid by companies. The results in model 3 (timeliness) for strong internal companies have a negative relationship between audit industry specialization and audit time lag. The study confirms the result of the regression thus all other things being equal audit firm specialization reduces reporting timeliness. In model 4 (interaction term) the test results for both weak and strong internal control companies are also in line with the regression results. However, the magnitude of impact of audit firm specialization on audit fee and timelines is higher on companies with weak internal control than those with strong internal control. This outcome suggests that there will be more audit work to be done on companies with weak internal controls and as a result this will increase the number of days for the audit work for companies with weak internal controls. As more days will be spent on the audit work for companies with weak internal controls, all other things

Table 5. Further analysis based on large and small companies—audit fee and audit report timeliness

| | Large Companies | | | Small Companies | | |
|----------|---------------------|----------------------|---------------------|---------------------|----------------------|----------------------|
| | Model (1) | Model (2) | Model (3) | Model (1) | Model (2) | Model (3) |
| SPEC | 0.002*** (0.001) | -0.034** (0.035) | 0.242*** (0.006) | 0.048** (0.017) | -0.044*** (0.004) | 1.104* (0.076) |
| ROA | 0.316 (0.423) | -1.151*** (0.005) | 0.673 (0.449) | 0.047 (0.112) | -0.036** (0.043) | 0.045 (0.111) |
| LEV | 0.147* (0.086) | 0.012 (0.301) | 0.151* (0.085) | 0.014*** (0.004) | 0.002*** (0.002) | 0.013*** (0.004) |
| OPR | 0.126 (0.104) | 0.023 (0.308) | 0.120 (0.103) | 0.039 (0.406) | 0.014 (0.200) | 0.034 (0.406) |
| CFO | 0.003 (0.600) | 0.002 (0.200) | 0.004 (0.600) | 0.000 (0.100) | 0.000 (0.100) | 0.000 (0.100) |
| LOSS | 0.352** (0.048) | 0.010* (0.054) | 0.353** (0.049) | 0.281*** (0.007) | 0.315*** (0.006) | 0.163 (0.111) |
| BIG4 | 0.793*** (0.004) | -0.015** (0.049) | 0.786*** (0.003) | 0.828*** (0.008) | -0.077* (0.082) | 0.807*** (0.008) |
| REC | 0.773** (0.027) | 0.118 (0.120) | 0.738** (0.027) | 0.781*** (0.005) | 0.181 (0.111) | 0.718*** (0.003) |
| GROWTH | | 0.013** (0.022) | | | 0.067*** (0.009) | |
| ARL | | | 0.324** (0.041) | | | 0.300** (0.019) |
| SPEC*ARL | | | -0.057** (0.038) | | | -0.241*** (0.009) |
| Constant | 0.908 (0.733) | 4.992*** (0.007) | 2.530** (0.043) | 7.702*** (0.003) | 5.178*** (0.008) | 9.288*** (0.004) |

(Continued)

Table 5. (Continued)

| | Large Companies | | | Small Companies | | |
|--|-----------------|-----------|------------------|-----------------|-----------|------------------------|
| | Model (1) | Model (2) | Model (3) | Model (1) | Model (2) | Model (3) |
| Year dum | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry dum | Yes | Yes | Yes | Yes | Yes | Yes |
| No. of Obs. | 591 | 591 | 591 | 513 | 513 | 513 |
| R-Squared | 0.651 | 6.835 | 0.717 | 0.724 | 0.538 | 0.539 |
| Coefficient test between the large and small firms | | | | | | |
| Audit fee | | | chi2 (1) = 7.94 | | | Prob > chi2 = 0.0022 |
| Audit lag | | | chi2 (1) = 0.11 | | | Prob > chi2 = 0.6021 |
| Audit fee (interaction term) | | | *chi2(1) = 10.11 | | | Prob > chi2 = 0.0000** |

Note: Table 5 reports the further analysis based on large and small companies—audit fee and audit report timeliness. *** indicates $p < 0.01$, ** indicates $p < 0.05$, while * indicates $p < 0.1$. The p-values are in parentheses and all variables are defined in the note to Table 1.

Table 6. Further analysis for state-owned and private companies—audit fees and audit report timeliness

| | State-owned Companies | | | Private Companies | | |
|----------|-----------------------|----------------------|---------------------|---------------------|----------------------|---------------------|
| | Model (1) | Model (2) | Model (3) | Model (1) | Model (2) | Model (3) |
| SPEC | 0.031** (0.011) | -0.052*** (0.009) | 0.216* (0.068) | 0.076* (0.071) | -0.121*** (0.005) | 0.385** (0.043) |
| SIZE | 0.207*** (0.005) | 0.007*** (0.006) | 0.205*** (0.005) | 0.193*** (0.006) | 0.023*** (0.006) | 0.191*** (0.006) |
| ROA | 0.314 (0.342) | 0.509*** (0.003) | 0.524 (0.344) | 0.067 (0.123) | 0.091* (0.070) | 0.077 (0.124) |
| LEV | 0.020*** (0.006) | 0.005*** (0.002) | 0.022*** (0.006) | 0.004** (0.013) | 0.004*** (0.005) | 0.004** (0.013) |
| OPR | 0.387*** (0.003) | 0.077* (0.064) | 0.354*** (0.002) | 0.022** (0.045) | 0.000 (0.108) | 0.023** (0.045) |
| CFO | 0.000 (0.100) | 0.000 (0.201) | 0.000 (0.101) | 0.000 (0.102) | 0.000 (0.101) | 0.000 (0.200) |
| LOSS | 0.355*** (0.009) | 0.219*** (0.008) | 0.255* (0.080) | 0.317** (0.038) | 0.247*** (0.002) | 0.293** (0.033) |
| BIG4 | 0.967*** (0.003) | -0.079** (0.040) | 0.936*** (0.003) | 0.578*** (0.009) | -0.056* (0.066) | 0.567*** (0.000) |
| REC | 0.916*** (0.005) | 0.168 (0.105) | 0.826*** (0.003) | 0.905*** (0.006) | 0.196 (0.136) | 0.889*** (0.007) |
| GROWTH | | 0.113*** (0.002) | | | 0.062*** (0.005) | |
| ARL | | | 0.382*** (0.004) | | | 0.124*** (0.005) |
| SPEC*ARL | | | -0.085** (0.029) | | | -0.067* (0.081) |

(Continued)

Table 6. (Continued)

| | State-owned Companies | | | Private Companies | | |
|--|-----------------------|---------------------|---------------------|---------------------|------------------|-------------------------|
| | Model (1) | Model (2) | Model (3) | Model (1) | Model (2) | Model (3) |
| Constant | 6.360*** (0.005) | 4.690*** (0.008) | 8.122*** (0.009) | 7.044*** (0.005) | 4.929 (0.142) | 7.658*** (0.004) |
| Year dum | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry dum | Yes | Yes | Yes | Yes | Yes | Yes |
| No. of Obs. | 392 | 392 | 392 | 708 | 708 | 708 |
| R-Squared | 0.818 | 0.7206 | 0.538 | 0.827 | 0.781 | 0.539 |
| Coefficient test between the state and private own companies | | | | | | |
| Audit fee 0.7318 | | | chi2 (1) = 0.12 | | | Prob > chi2 |
| Audit lag | | | chi2 (1) = 7.22 | | | Prob > chi2 = 0.0046*** |
| Audit fee (interaction term) | | | chi2(1) = 9.11 | | | Prob > chi2 = 0.0005*** |

Note: Table 6 reports the further analysis for state-owned and private companies—audit fees and audit report timeliness. *** indicates $p < 0.01$, ** indicates $p < 0.05$, while * indicates $p < 0.1$. The p-values are in parentheses and all variables are defined in the note to Table 1.

Table 7. Further analysis for the internal controls—audit fees and audit report timeliness

| | Weak control | | | Strong control | | |
|----------|---------------------|----------------------|---------------------|---------------------|----------------------|----------------------|
| | Model (1) | Model (2) | Model (3) | Model (1) | Model (2) | Model (3) |
| SPEC | 0.264*** (0.008) | -0.003** (0.034) | 0.055** (0.026) | 0.113*** (0.009) | -0.048*** (0.001) | 0.026*** (0.008) |
| SIZE | 0.300*** (0.003) | 0.028** (0.026) | 0.342*** (0.002) | 0.348*** (0.007) | 0.012** (0.010) | 0.357*** (0.006) |
| ROA | -0.175* (0.055) | -0.002** (0.011) | -0.168* (0.055) | 0.324*** (0.004) | -0.001*** (0.001) | 0.223* (0.052) |
| LEV | 0.060** (0.022) | 0.008*** (0.009) | -0.048** (0.023) | 0.011*** (0.000) | 0.003*** (0.002) | 0.005*** (0.005) |
| OPR | 0.001 (0.103) | 0.000** (0.020) | 0.001 (0.301) | 0.001 (0.302) | 0.000*** (0.002) | 0.001** (0.040) |
| CFO | 0.016** (0.046) | | 0.008* (0.055) | -0.043* (0.062) | | -0.025** (0.021) |
| LOSS | 0.120** (0.042) | 0.144*** (0.007) | -0.119** (0.044) | 0.038 (0.143) | 0.102*** (0.005) | -0.002** (0.042) |
| BIG4 | 0.113*** (0.006) | 0.003 (0.134) | 0.194 (0.402) | 0.277*** (0.005) | -0.035* (0.064) | 0.418*** (0.006) |
| REC | 0.178*** (0.005) | | 0.826*** (0.006) | 0.184*** (0.004) | | -0.126*** (0.004) |
| GROWTH | | -0.009*** (0.009) | | | 0.019** (0.038) | |
| ARL | | | -0.017** (0.047) | | | -0.385** (0.037) |
| SPEC*ARL | | | -0.042** (0.013) | | | -0.153** (0.047) |

(Continued)

Table 7. (Continued)

| | Weak control | | | Strong control | | |
|---|---------------------|---------------------|--------------------|---------------------|---------------------|-------------------------|
| | Model (1) | Model (2) | Model (3) | Model (1) | Model (2) | Model (3) |
| Constant | 2.411*** (0.009) | 2.209*** (0.008) | 2.519** (0.042) | 1.204*** (0.006) | 1.912*** (0.004) | 1.180** (0.036) |
| Year dum | Yes | Yes | Yes | | Yes | Yes |
| Industry dum | Yes | Yes | Yes | Yes | Yes | Yes |
| No. of Obs. | 493 | 493 | 493 | 607 | 607 | 607 |
| R-Squared | 0.827 | 0.842 | 0.807 | 0.847 | 0.804 | 0.859 |
| Coefficient test between the weak and strong internal control | | | | | | |
| Audit fee | | | chi2 (1) = 2.83 | | | Prob > chi2 = 0.0118** |
| Audit lag | | | chi2 (1) = 8.04 | | | Prob > chi2 = 0.0012** |
| Audit fee(interaction term) | | | chi2 (1) = 11.22 | | | Prob > chi2 = 0.0000*** |

Note: Table 7 reports the further analysis for the internal controls—audit fees and audit report timeliness. *** indicates $p < 0.01$, ** indicates $p < 0.05$, while * indicates $p < 0.1$. The p-values are in parentheses and all variables are defined in the note to Table 1.

being equal the audit fees charge for those companies will also increase. However, for companies that have strong internal controls, the outcome suggests that less audit time will be spent on the audit of these companies due to the effectiveness of the internal controls. As a result, it will reduce the audit fees charge for these companies compared to companies with weak internal controls.

5.5. Robustness checks

To check the sensitivity and the robustness of the results obtained for the effect of audit firm industry specialization on audit fees, we employ the revenue measure of market share. The result of the robustness check is presented in Table 8. Unlike the previous analysis where we used asset to measure market share, this time we used total revenue to measure market share. The firm with the largest market share of revenue has most knowledge about that particular industry. A specialist audit firm, an audit firm that has the greatest market share (of revenue) in a given industry in a given year takes a value of 1 and otherwise, 0. Additionally, we use the fraction of number of auditors over the total number of auditors in an industry in a given year to measure specialization where a higher fraction indicates a specialist auditor. We run the regression with the new measure of specialization (SPEC—revenue) and the auditor fraction measure (SPEC-Fraction) as the independent variables and audit fee as the dependent variable. At the same time, we control for firm-specific characteristics. The regression results are shown in Table 3–5 displays the regression for SPEC-revenue as independent and SPEC-Fraction as the independent variables. The effect of audit firm industry specialization on audit fee and audit report timeliness are presented as Model (1) and Model (2), respectively, while the effect of the cross term, specialization*Audit report lag (SPEC*ARL) is presented as Model (3).

The results obtained from both the revenue and the fraction of auditors' measures of specialization are consistent with the main results reported, confirming that specialization indeed increases audit fee because specialist auditors have more expertise in the industry. The result indicates that there is a positive relationship between audit fees and audit industry specialization. The robust results also show that specialization measured by both the revenue and fraction measures

Table 8. Robustness check—specialization impact on audit fee and audit report timeliness

| | SPEC -Revenue | | | SPEC—Fraction | | |
|---------------|---------------|-----------|-----------|---------------|-----------|-----------|
| | Model (1) | Model (2) | Model (3) | Model (1) | Model (2) | Model (3) |
| SPECA-Revenue | 0.027** | -0.087*** | 0.045* | | | |
| | (0.013) | (0.008) | (0.082) | | | |
| SPEC-Fraction | | | | 0.398* | -0.379** | 0.230** |
| | | | | (0.092) | (0.044) | (0.043) |
| ARL | | | 0.303*** | | | 0.295*** |
| | | | (0.004) | | | (0.003) |
| SPEC*ARL | | | -0.003* | | | -0.006** |
| | | | (0.073) | | | (0.016) |
| Constant | 6.768*** | 4.788*** | 8.223*** | 6.720*** | 4.762*** | 8.147*** |
| | (0.005) | (0.003) | (0.007) | (0.009) | (0.009) | (0.008) |
| Year dummy | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry dum | Yes | Yes | Yes | Yes | Yes | Yes |
| No. of Obs. | 1,100 | 1,100 | 1,100 | 1,100 | 1,100 | 1,100 |
| R-Squared | 0.756 | 0.611 | 0.575 | 0.667 | 0.538 | 0.501 |

Note: Table 8 reports the robustness check—specialization impact on audit fee and audit report timeliness. *** indicates $p < 0.01$, ** indicates $p < 0.05$, while * indicates $p < 0.1$. The p-values are in parentheses and all variables are defined in the note to Table 1.

negatively impact audit report time lag. Again, the robustness results show that the cross-term (SPEC*ARL) negatively impacts audit fee similar to the main regression results. The consistency of the signs of the regression parameters and the significance confirms the robustness of the results obtained for the main regression results.

6. Conclusion and recommendations

This study explored the effect of audit firm industry specialization on audit fees and audit time lag and the role of audit report time lag in the specialization and audit fee nexus. We used data set from 100 quoted and unquoted Ghanaian firms from 2008 to 2018. We find a significant positive impact of specialization on audit fees which implies that audit firm industry specialization increases the audit fees paid. We also find significant negative impact of specialization on audit report time lag, which means that audit firm industry specialization reduces the number of days used to cover and finalize audit. The results further show that the interaction of audit firm industry specialization and ARL significantly reduces audit fee premium paid due to the short time spent on the audit. The robustness test was in line with the results of all the three models in the study. Further analysis was done on large and small companies, state-owned and private companies, weak and strong internal controls. In the small and large companies' comparison, the results showed that audit firm industry specialization increases the audit fees paid by companies and reduces the audit report time lag for both large and small firms. The result was more significant in large companies than small companies on audit industry specialization impact on audit fees. In large companies the complex nature of their controls and bureaucratic nature may expand the audit scope which will infer on paying more fees than the small companies. The impact of audit industry specialization on audit time lag was more significant in small companies than the larger companies due to the size of the companies. The results also showed that the interaction term (Specialization*ARL) is more significant in the small companies than the larger companies. The small companies have less scope of audit which makes them easier to audit and the size of the business is far smaller which makes audit easier compared to the larger companies. This makes them the potential group to get reduction in audit fees premium because audit timeliness is reduced drastically. The result was more significant in state-owned companies than private companies in terms of the impact of audit industry specialization on audit fees. Transparency and accountability are very critical when it comes to financial information of state-owned companies because the shareholders have high interest in it. This makes it easier to audit because there is less room for errors. The results on audit firm specialization and audit timeliness are equally significant in both state-owned and private companies. The result on the interaction term was more significant in the public companies than private companies. State-owned companies are likely to benefit from reduced fees because they do not change controls and procedures frequently as compared to private companies who have the liberty to change anytime. In the comparison between weak and strong internal controls a significant difference between the group in terms of audit industry specialization and audit fees is found. The result shows that companies with strong internal control are more significant than the ones with weak control. The difference between them could be attributed to strong internal controls having less errors and misstatement which will result in investigations by the audit team. They are likely to be backed by an audit committee. There was also a significant difference between the groups in terms of the interactive variables.

This study concludes that companies that contract audit firms with industry specialization pay a higher fee because of the audit firm expertise and their audited report are done in time. The short time to complete the audit leads companies to enjoy a reduction in the premium paid to the audit firm due to their knowledge in the industry.

Therefore, this study recommends that the institutions charged with the supervision of audit firms in Ghana need to implement policies that will encourage audit firm industry specialization. This is because companies audited by audit firms with industry specialization are less likely to have material misstatement since audit firms with industry specialization have much knowledge and experience in those areas. In addition, audit firms need to be encouraged to specialized because it

is cost effective as they are able to charge a premium for their services which are timely and efficiently done. In line with this, those charged with supervision of audit firms in Ghana such as the Institute of Chartered Accountants Ghana (ICAG) should also organize more training and workshops to train, encourage and provide advisory roles in relation to audit specialization. There could also be financial incentives such as certain tax exemptions in some areas for audit firms that have specialized in various areas. Furthermore, given that audit firm with industry specialization are able to provide relatively more efficient audit services, it is recommended that companies go in for these audit firms as this will boost investor confidence and also reduce agency problems.

The study brought to light some interesting findings in the subject area under study that calls for further research to include other companies in Ghana that were not captured under the sectors in the study who observe corporate governance fully appreciate the dynamics of the economic consequences of audit firm industry specialization. Moreover, the current study used a quantitative approach, and it is recommended that similar studies using qualitative approach should be conducted so that the findings can be compared for effective decision-making. However, the sample size of the study was small since quarterly reports are not available now, the sample size can be expanded in the future when such data becomes available.

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Abbreviations

ARL audit report time lag

IFRS International Financial Reporting Standards

ISA International Standards on Auditing

BIG4 big four audit firm

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