Audit Partner Industry-Specific Knowledge and Audit Quality

Abstract: We develop and validate a new measure of industry-specific knowledge at the audit partner level and assess its impact on audit quality in the U.S. context. We validate our measure by demonstrating its association with key sources of industry-specific knowledge, such as the number of clients, the complexity of client firms, and the influence of audit firms, while distinguishing it from financial statement complexity. Our empirical results indicate a positive relationship between general industry knowledge and audit quality, as evidenced by lower discretionary accruals and a reduced likelihood of issuing inconsistent material weakness opinions. These findings underscore the crucial role of an audit partner's industry-specific knowledge in enhancing audit quality and provide insights into the mixed results observed in previous discussions on the impact of audit partner industry expertise.

Keywords: Audit partner, audit quality, industry experience, industry knowledge

1. INTRODUCTION

Audit industry expertise, synonymous with industry specialization, is considered a relative concept without a widely accepted definition (Moroney & Carey, 2011). Audit firms often cultivate industry expertise as a distinct competitive advantage, incorporating specialized knowledge and technologies (Jaggi et al., 2015; Payne, 2008; Reichelt & Wang, 2010; Solomon et al., 1999). This expertise not only attracts more clients by building a strong reputation but also incentivizes audit firms to enhance audit quality (Francis et al., 2005; Krishnan, 2005). With growing interest in research at the audit partner level, the focus on industry expertise has evolved (Cameran et al., 2022; Gul et al., 2013). However, applying industry expertise measurements at the audit partner level often lacks theoretical support and existing measurements face criticism (Audousset-Coulier et al., 2016; Causholli et al., 2010). Researchers typically use market share-based measurements, yielding mixed results regarding audit partners' influence on audit quality (Aobdia et al., 2021; Chi & Chin, 2011; Chi et al., 2017; Ittonen et al., 2015). This suggests that our understanding of how an audit partner's industry experience impacts audit quality remains limited.

Libby and Tan (1995) describe audit expertise at the individual level as knowledge-related determinants of performance. Knowledge can be acquired from experience in a specific industry, and enhances audit performance (Bonner & Lewis, 1990; Libby & Tan, 1995). Research on audit expertise at the audit partner level is limited, primarily due to the challenge of finding a proxy to capture the knowledge audit partners gain from their tasks, as this knowledge is not directly observable. Additionally, audit partner information is often not publicly available in many jurisdictions. We identify the extent of an audit partner’s industry-specific knowledge and its relation to audit quality by introducing a new measure of general industry knowledge.

The relationship between industry expertise and audit quality warrants further exploration due to the mixed results on the impact of industry expertise. On the one hand, an audit partner’s industry expertise may not significantly affect audit quality.

The responsibilities of audit partners are varied, with career advancement often relying more on skills and activities such as networking (Downar et al., 2021). Factors like cognitive abilities and leadership behaviors (Cameran et al., 2022) might be more critical than industry or client-specific knowledge. On the other hand, industry expertise could improve audit quality. Measuring this expertise is however challenging. Some studies indicate no significant impact and others show a positive impact of audit partner industry expertise on audit quality (Aobdia et al., 2021; Chi & Chin, 2011; Chi et al., 2017; Ittonen et al., 2015). Litt et al. (2014) found that new audit partners to a client are associated with lower audit quality, suggesting that an audit partner still needs to accumulate both knowledge and experience to benefit audit quality.

The U.S. context is ideal for our study due to the requirement for disclosures, including Form AP (PCAOB) and XBRL tags (SEC), which provide audit partner identification and textual disclosures in financial statements, respectively. We create a proxy for general industry knowledge and investigate its influencing factors. We utilize XBRL text tags, specifically the textual disclosures in Item 8 of financial statements (10-K), to identify the accounting topics disclosed by client firms. These disclosed accounting topics are considered the client's material topics or issues (Abernathy et al., 2019; Iselin & Iskandar, 2000). Dealing with these issues or topics develops unique industry-specific knowledge (Messner, 2016). Exposure to a broader range of accounting topics within a specific industry provides audit partners with a more comprehensive understanding of that industry. Consequently, our new proxy for general industry knowledge is quantified by counting the number of accounting topics an audit partner encounters within an industry over the past three years scaled by the total number of accounting topics for the client's industry within those three years.

Using this measure, we investigate the impact of an audit partner's general industry knowledge on audit quality. We proxy audit quality with discretionary accruals (Kothari et al., 2005), inconsistent internal control opinions (Cunningham et al., 2019; Ge et al., 2017), and restatements (Cunningham et al., 2019). Our analysis reveals negative correlations between general industry knowledge and both discretionary

accruals and inconsistent internal control opinions. After conducting several sensitivity tests, we find evidence suggesting that industry-specific knowledge at the audit partner level enhances audit quality.

We also validate our new proxy by demonstrating that it captures various aspects of experience and differs from the effects of disclosure complexity. Our measure is determined by several dimensions of audit task experience, including the market share of audit partners within a specific industry, the number of clients within an industry, the complexity of client firms, and affiliation with Big 4 audit firms.

Further, we show that the number of accounting topics for each client firm is influenced by factors similar to those affecting disclosure complexity, aligning with the findings of Dyer et al. (2017) on the determinants of 10-K length. Finally, we find that the number of accounting topics disclosed by client firms is negatively correlated with audit quality, contrasting with our main findings on general industry knowledge.

We make several contributions to the auditing literature. First, we provide new evidence on the impact of industry expertise noted in prior research, demonstrating that audit partners accumulate knowledge from industry-specific experience, which enhances audit quality. Second, we expand the discussion on audit partners' industry expertise by introducing a new measure of industry-specific knowledge, offering a fresh and meaningful perspective for investigating this expertise. We highlight that knowledge from accounting topics is a specific aspect that audit partners can acquire, countering the traditional view in the behavioral auditing literature that sees accounting topics as uniform tasks across industries (Moroney & Carey, 2011). By incorporating accounting topics into industry expertise research as a component of non-transferable industry knowledge, we leverage increased auditor information disclosure to develop new evidence.

Third, we respond to calls for more research at the audit partner level, providing unique empirical evidence on the audit partner's role. As Francis (2023) notes, it remains unclear how partners influence audit quality. Given that audit partners have diverse tasks and responsibilities, understanding how audit partners enhance audit

quality is valuable through the accumulation of industry knowledge.

Finally, our findings prompt deeper consideration of how developing audit partners' expertise benefits both audit and client firms. Audit firms have recognized the importance of cultivating audit partners' industry-specific knowledge as a competitive edge (Elder et al., 2015; Jaggi et al., 2015). We offer potential strategies for audit firms to foster industry expertise at the audit partner level. For client firms seeking audit partners with greater expertise for higher audit quality, our results introduce a new dimension to consider.

In the next section, we provide a literature review on research related to industry expertise and then develop the hypotheses. Section 3 explains our methodology. Section 4 details the sample selection process and data description. Section 5 presents validity tests of our new measure and Section 6 contains empirical results and additional tests. Section 7 concludes.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

2.1 Industry Expertise at the Audit Firm and Audit Partner Levels

In auditing archival research, industry expertise, or industry specialization, typically concentrates on the audit firm level, where expertise is less likely to be transferable across different industries. The U.S. Government Accountability Office (GAO) notes that "a firm with industry expertise may exploit its specialization by developing and marketing audit-related services specific to clients in the industry" (GAO, 2008, p. 111). Audit firms develop industry-specific knowledge through investments in training, personnel, and technology within a particular industry setting (Bonner & Lewis, 1990; Libby & Tan, 1995; Jaggi et al., 2015; Payne, 2008; Reichelt & Wang, 2010; Solomon et al., 1999). Bills et al. (2015) indicate that there are scale economies in auditor knowledge within industries. Auditors specializing in a particular industry are more motivated to identify and report risks due to concerns about their reputation and brand (Francis et al., 2005; Krishnan, 2005). Many studies use an audit firm's market share in a specific industry as a measure of industry expertise (Balsam et

al., 2003; Gaver & Utke, 2019; Gul et al., 2009; Jaggi et al., 2015; Kim et al., 2015; Knechel et al., 2007; Lim & Tan, 2008; Reichelt & Wang, 2010), although this metric has faced criticism (Audousset-Coulier et al., 2016; Causholli et al., 2010).

The discussion and metrics assessing the link between audit firm expertise and audit quality are similarly applied at the audit partner level. Research examining the impact of industry expertise on audit quality has yielded mixed results (Aobdia et al., 2021; Chi & Chin, 2011; Chi et al., 2017; Ittonen et al., 2015). Aobdia et al. (2021) report no significant link between various proxies of audit quality and audit partner expertise. Chi & Chin (2011) examine the Taiwan market and find that lead partners are associated with a higher likelihood of issuing modified audit opinions and lower discretionary accruals. Another approach to measuring auditor expertise considers the number of clients (Chi et al., 2017; Ittonen et al., 2015). Ittonen et al. (2015) find that audit partners with a larger number of public clients are associated with smaller discretionary accruals. Chi et al. (2017) incorporate the number of clients for audit partners as a proxy of expertise in their control variables but find only weak evidence of a significant link with discretionary accruals.

2.2 General Knowledge of a Specific Industry

We posit that the relationship between industry expertise and audit quality at the audit partner level differs from that at the audit firm level. This variance is primarily due to the challenges in scaling economies and increasing investments at an individual level, given the limited workload capacity of individuals. It is widely accepted that the accumulation of experience contributes to better performance (Anand et al., 2016; Gavetti et al., 2005; Holyoak & Koh, 1987). Experience accumulation enhances memory, which can be converted into behavior (Tubbs, 1992; Tulving, 1989). We define audit performance as the audit quality provided to one client, with measurements detailed in Section 3.

Previous literature acknowledges the impact of industry experience. Johnson et al. (1989) support that auditors with relevant industry experience show better

performance in detecting errors. Drake et al. (2019) indicate that clients within the same industry often face similar conditions and economic forces, making prior industry experience of auditors particularly relevant to engaged clients. Bills et al. (2015) argue that expertise can enhance audit quality due to the presence of similar risk characteristics and audit procedures within similar industries. We assert that audit partners acquire industry-specific knowledge through direct industry experience, and the depth of understanding of a specific industry varies among audit partners due to their limited workload capacity.

However, we may not find any evidence supporting a relationship between industry-specific knowledge and audit quality. Downar et al. (2021) explore the determinants of partner promotions in Big 4 firms and find that networking activities are crucial for an auditor's career progression. Gipper et al. (2021) report that total partner hours constitute only 6% of audit hours. These findings suggest that the primary responsibilities of an audit partner may not involve specific audit tasks. Instead, audit partners may impact audit quality through cognitive abilities or leadership behaviors (Cameran et al., 2022). Our null hypothesis is as follows:

H1: Audit partners' general industry knowledge is not associated with audit quality.

3. METHODOLOGY

3.1 Measurement of General Industry Knowledge

We understand general industry knowledge as a subspecialty knowledge following Bonner & Lewis (1990), who define it as 'subspecialty knowledge related to specialized industries or clients, acquired by persons who have experience with specific audit clients, with certain industries, and/or firm training in those specialized areas'.

We propose the number of accounting topics encountered by a partner at his/her client as discussed in the client's financial statements to calculate an auditor's general industry knowledge for several reasons (see Appendix A for the list of accounting

topics). First, each accounting topic contains unique industry characteristics. Client company disclosures differ across industries (Ali et al., 2014). Drake et al. (2019) agree that financial reporting standards and auditing practices are closely tied to a client's industry. Messner (2016) indicates that accounting practices vary across industries, with certain practices like research and development and inventory being absent in some. We reckon that accounting topics contain unique aspects of knowledge about the industry. Second, auditors acquire unique industry knowledge from disclosed accounting topics. Danos et al. (1989) argue that auditors accumulate unique knowledge about accounting rules or applications in specific industries or client firms. Bills et al. (2015) suggest that the complexity of industry-specific accounting practices impacts an auditor's operational efficiency. That means auditors spend time on applications of accounting rules, giving them larger possibilities to acquire knowledge from direct audit tasks experience.

We identify accounting topics from the footnotes of financial statements. Footnotes are part of the scope of the audit (Abernathy et al., 2019). When a company elaborates on an accounting topic in its footnotes, it is considered an important topic for that company. Iselin & Iskandar (2000) report that industry is an important factor of disclosure materiality thresholds. Therefore, audit partners may acquire both client and industry knowledge within accounting topics disclosed in footnotes of financial statements.

Additionally, the accounting topics an individual auditor experiences from their direct audit tasks experience vary, mainly because the accounting topics client firms refer to vary among firms within a specific industry. Given the limited time individual auditors have to interact with clients, they are likely to encounter a range of accounting topics specific to an industry. Accounting topics are used in behavioral auditing research as manipulation of task-based experience. For example, Moroney & Carey (2011) consider 'accounting for research and development costs'. In their experiment, 54 participants had task-based experience, and 112 participants did not. Therefore, auditors may be engaged with several accounting topics through direct experience within the

industry, but not all of them.

Auditing clients with various accounting topics allows audit partners to gain diverse and additional insights into that industry. Thus, audit partners with extensive experience across numerous accounting topics should have a more comprehensive understanding of the industry. We focus solely on the quantity of accounting topics within an industry, without considering the variations in accounting methods within individual topics and the weight of each topic.

Our general industry knowledge variable is a ratio calculated as the sum of accounting topics used by an audit partner over the past three years in the client's industry, divided by the total number of accounting topics for the client's industry within those three years. The idea comes from DeFond & Hung (2003) who use the ratio with the sum of accounting choices for each firm scaled by the number of accounting choices in the industry to calculate accounting choice heterogeneity. In this study, we use the Fama-French 48 industry classifications to conduct calculations, similar to Francis & Gunn (2017) and Gal-Or et al. (2022)[1].

$$GINDK_{jkt} = \frac{Partner\_Topic\_Num_{jt-1,t-2,t-3}}{Industry\_Topic\_Num_{kt-1,t-2,t-3}} \quad (1)$$

Accounting topics are identified from XBRL, which is a markup language that uses tags to encode data. Financial statement preparers are required to tag each financial concept in Item 8 of the 10-K (and 10-Q) filings. It became mandatory for large accelerated filers in 2009 and all remaining filers in 2011 (Hoitash et al., 2021). We use XBRL text tags as the source to identify whether a company mentions a topic[2]. As the GAAP taxonomy contains the definitions for each standard tag, these definitions

[1] We also apply the Fama-French 12 industry classifications following Prentice et al. (2023) and find similar results.

[2] The XBRL tags are set by accountants in client firms and are not audited. There is a possibility that accountants may not assign tags to footnotes. Therefore, we have removed observations where zero accounting topics were counted according to XBRL text tags. Additionally, we double-checked the financial statements of client firms that disclosed fewer than 10 accounting topics and found lengthy texts that were not tagged. We also excluded those client firms that disclosed fewer than 10 accounting topics within a single year.

(categories) are used as the accounting topics[3].

If a company mentioned at least one XBRL text tag related to a specific accounting topic within a 3-year duration, it is counted as 1 to indicate that the audit partner of that company has experience in that topic. Then we aggregate how many topics an audit partner used in the client's Fama-French 48 industry for each 3-year duration. For example, for audit partners who provided services in 2020, their general industry knowledge is based on the accounting topics they experienced in audit tasks in 2017, 2018, and 2019 in a specific industry. The total number of industry accounting topics is calculated based on the same 3-year duration and the Fama-French 48 industry classifications.

Table 1 reports descriptive statistics on the number of accounting topics per firm within each industry. On average, a firm has 36 accounting topics in a year tagged in their financial statement Item 8. The mean number of accounting topics ranges from 34 to 39. However, a similar topic number doesn't mean similar accounting topics. Each industry has on average 108 possible accounting topics. The differences between industry number and client firm number of accounting topics mainly come from two sources. First, the content of disclosure varies between companies. Although Drake et al. (2019) report that auditors would browse financial statements of clients' competitors in the same industry or with similar accounting issues, we still find that many firms disclose some unique accounting topics. Second, we apply both level 1 and level 2 definitions in accounting policies from the GAAP taxonomy. Some topics may have two potential definitions accountants can choose. For example, footnote disclosure about fair value topics may be allocated to two categories: 'fair value measures and disclosure' in level 1 definition and 'fair value measurement policy text block' in accounting policies. This fact would not impact our interested variable *GINDK*, because whatever tags the accountants of client companies choose, they only count 1 topic, and

[3] The GAAP taxonomy, known as the GAAP Financial Reporting Taxonomy (GRT), is developed and maintained by the Financial Accounting Foundation (FAF) and the Financial Accounting Standards Board (FASB). This GAAP taxonomy is publicly accessible. For instance, the 2023 GAAP Financial Reporting Taxonomy can be found at the following website:
https://www.fasb.org/Page/PageContent?PageId=/xbrl/2023-gaap-financial-reporting-taxonomy.html

the percentage would be the same. We analyze determinants of the number of accounting topics to validate our new variable in Section 4.

Table 1: Number of accounting topics per firm within each industry

3.2 Dependent Variables

We apply several proxies to measure audit quality because it's unobservable. First, we calculate performance-matched discretionary accruals from the modified Jones model suggested by Kothari et al. (2005) and construct a variable with absolute values (*ABS_DA*), and a variable with positive values (*DA_ABOVE*) following Li et al., (2017) and Gaver & Utke (2019). Second, we estimate the quality of the internal control on financial report (ICFR) audit opinions as a proxy for audit quality (Cunningham et al., 2019; Ge et al., 2017). When the auditor issues a material weakness result that is inconsistent with the suspect material weakness we calculated with the model, then the variable *INCONSIS_MW* takes the value of 1 and 0 otherwise. The inconsistent material weakness might represent the miss or failures of reporting (Gipper et al., 2021). Third, we apply restatements (*RESTATEMENT*) as a proxy for audit quality, which indicates whether the auditor fails to detect and report a misstatement (Lee et al., 2019). The detailed definitions of variables are in Appendix B.

3.3 Research Design

3.3.1 Validating the measurement of general industry knowledge

Before directly applying our new measurement of general industry knowledge (*GINDK*), we conduct validity tests to mitigate potential concerns. Firstly, we model general industry knowledge (*GINDK*) as a function of audit partner, audit firm, and client firm characteristics to indicate that our measurement captures various sources of industry knowledge. For audit partner characteristics, we consider partner expertise for the past 3 years (*PAR_EXPERTISE_3Y*), the number of clients in an industry (*NUM_CLIENT_3Y*), and whether the audit partner audits for client companies with

more than one Fama-French 48 industry (*MUL_IND_3Y*). Audit firm characteristics include Big 4 audit firms (*BIG_4*). Client firm characteristics involve the complexity of the industry (*COMPLEX_EXP_3Y*). Consistent with the independent variable, *PAR_EXPERTISE_3Y, NUM_CLIENT_3Y, MUL_IND_3Y,* and *COMPLEX_EXP_3Y* variables are aggregated every 3 years. Definitions of variables are in Appendix B.

These determinants are based on previous literature. Literature finds that audit partner exhibits systematic differences in their audit quality levels (Cameran et al., 2022; Gul et al., 2013). Audit partners' number of clients should impact general accounting knowledge because the client is a source of industry knowledge from different perspectives (*NUM_CLIENT_3Y*). We assume that audit partners have limited energy and working hours. Even there are criticisms of simply using the number of audit engagements as the proxy for audit partner workload (Lennox & Wu, 2018) and several studies do not find evidence to support the correlation between client number and audit quality (Ashton, 1991; Burke et al., 2019; Goodwin & Wu, 2016), the number of clients is one of the critical factors affecting the variety of experience. Barton (2005) indicates that clients of Big 5 and non-Big 5 audit firms differed substantially. Big 4 (*BIG_4*) audit firms have distinct company cultures and client pools, which may lead to different experiences for their partners. Then we consider client characteristics. Gramling & Stone (2001) indicate that conglomerate companies are difficult to categorize into a particular industry. We reckon that the accounting topic the conglomerate companies used should differ from firms that focus on an industry (*MUL_IND_3Y*). Francis & Gunn (2017) emphasize the effect of complex accounting rules for specific industries. Complex industry is defined as industries that have key accounting issues in AICPA/FASB guidance (Francis & Gunn, 2017). If the industry a client belongs to is classified as a complex industry (*COMPLEX_EXP_3Y*), the guidance for key accounting issues may lead to complex tasks for partners and make them differ from other industries without special guidelines.

One potential concern may relate to the source used for calculating our new metric. The number of accounting topics might correlate with the length of financial

statements. The longer the financial statements, the more accounting topics should be included. Consequently, our regression results might be driven by characteristics within financial statement disclosure, rather than the knowledge of audit partners. Therefore, we aim to validate that our primary interest variable performs differently from the client's characteristics within financial statement.

We model *CIK_TOPIC* as a function of the audit firm and client firm characteristics. We follow Cazier & Pfeiffer (2016) who conclude that the 10-K length is related to the complexity, redundancy, and residual disclosure. It is reasonable that firms with complex business transactions have more material information to disclose. Therefore, we include all control variables of client company characteristics in equation (2). We also consider the impact of auditors (*BIG_4*) on financial statement disclosure. Dyer et al. (2017) argue that the Big 4 auditor is an important determinant of textual attributes.

After that, we examine the correlation between the number of accounting topics of client firms (*CIK_TOPIC*) and audit quality, to further display the difference of our new measurement from financial statement disclosure characteristics. We replace the key variable *GINDK* in equation (2) with *CIK_TOPIC,* and then compare the regression results. It is expected that the correlation between *GINDK* and audit quality is in the opposite direction to the correlation between *CIK_TOPIC* and audit quality. *CIK_TOPIC* should correlate with characteristics within financial statement disclosure of client firms, while Abernathy et al., (2019) find a negative significant correlation between financial statement footnote readability and audit quality (specifically first going-concern opinions in their study). Conversely, we predict that the accumulation of industry knowledge by audit partners can improve the audit quality.

3.3.2 General industry knowledge and audit quality

Our interest variable is the general industry knowledge for the past 3 years (*t-1, t-2, t-3*) at audit partner (*j*) level in an industry (*k*). *GINDK* is a continuous variable, and we examine its impact on audit quality of client firm (*i*) at year *t*.

$$Audit\ Quality_{it} = \beta_0 + \beta_1 GINDK_{jkt-1,t-2,t-3} + \sum \beta_n Controls(audit\ firm, clients)_{it} + Fixed\ Effects\ + \mu_{it} \quad (2)$$

Our audit quality proxies include two values calculated with performance-matched discretionary accruals from the modified Jones model (*ABS_DA*, and *DA_ABOVE*), material weakness (*INCONSIS_MW*), and restatements (*RESTATEMENT*). We control client company characteristics followed Cunningham et al. (2019) and Aobdia et al. (2021), including size (*SIZE*), leverage (*LEV*), loss (*LOSS*), growth of sales (*SALE_GROWTH*), book-to-market ratio (*BTMR*), CFO (*CFO*), ROA (*ROA*), lag of total accruals (*LAG_ACC*), the number of business segments (*BUSSEG*), whether company's fiscal year end is in December (*YEAR_END*), and whether they receive a going-concern opinion (*GC*). We also include restatements (*RESTATEMENT*), and material weakness (*MW*) separately. Like Liu & Xu (2021), we include audit firm characteristics, including tenure of the audit firm (*TENURE*), and whether the audit firm is a Big 4 firm (*BIG_4*). we consider the effect of partner rotation (*ROTATION*), which may impact audit quality (Chi et al., 2009; Gipper et al., 2021). Furthermore, we add the number of accounting topics of client firms (*CIK_TOPIC*) and prevalent measurement of partner expertise (*PAR_IND_LEADER*) in the regression. The definitions of variables are in Appendix B. All control variables are calculated for each fiscal year, which differs from variables as determinants of general industry knowledge. In addition, we include year fixed effect, industry fixed effect based on Fama-French 48 industry classifications, and audit partner fixed effect to control audit partner characteristics. We use robust standard errors in the model clustered by company.

4. SAMPLE SELECTION AND DATA DESCRIPTION

4.1 Sample Selection

The Public Company Accounting Oversight Board (PCAOB) discloses Form AP with the name, partner IDs, and other auditor-related information from January 31st,

2017 (fiscal year starting from 2016). This file can be directly obtained from PCAOB's website. Calculating our independent variable relies on XBRL tags, which are obtained from the 'Financial Statement and Notes Data Sets', publicly available on the SEC website. We exclude numerical tags and extended tags[4] because our interest is the text disclosure in Item 8 of the 10K, and extended tags do not belong to any definition in the GAAP taxonomy list. We obtain audit-related information from Audit Analytics. The financial data of sample firms are collected from Compustat. After calculating independent variable general industry knowledge with available data from fiscal year 2016, our sample period for the main interest variables is 2019-2022.

Table 2: Sample selection

Table 2 displays our sample selection process and the sample distribution by year. The cutoff date of our observations is March 1st, 2024. Form AP includes 86,931 client-years observations with 24,349 unique clients and 7,579 unique partners[5]. After combining with XBRL tags data and dropping missing values, we obtained 37,891 client years from 2016 to 2022 with 8,947 unique clients and 5,632 unique partners for calculating general industry knowledge. We only select the client firms if their 'Audit Report Type' in Form AP is 'Issuer'. After excluding missing data in Compustat and Audit Analytics, and excluding financial sectors, we obtain observations from 2016 to 2022. These observations are used for part of validity tests, including 17,254 observations with 4,115 unique clients. To regression with our primary interest variable *GINDK*, we exclude observations between 2016 and 2018, and observations where the audit partner does not have clients within the industry for the past 3 years. We obtain 8,279 client-years with 3,318 unique clients and 2,312 unique partners.

[4] Here we only consider standard tags. The number of extended tag can be a way to shadow the poor performance of company (Huang et al., 2019) and extended tags do not belongs to any clear taxonomy. In our dataset, extended tags make up only around 15% of total tags number for each company on average.

[5] Our audit partner level variables, including *PAR_EXPERTISE_3Y, NUM_CLIENT_3Y, COMPLEX_EXP_3Y,* and *MUL_IND_3Y*, are calculated based on data before merging with XBRL tags data.

4.2 Data Description

In Table 3, Panel A displays descriptive statistics for determinants of general industry knowledge variable (*GINDK*), which are calculated with a 3-year duration. In our interest variables, client companies have around 36.18 accounting topics per year. On average, the general industry knowledge (*GINDK*) of an experienced audit partner within the past 3 years is 35.1%, which means client firms have audit partners who experienced 35 percent of accounting topics within that industry. After aggregating by 3 years duration, the average partner's market share of audit fees in a specific industry is 1%. More than half (70.1%) of client firms have a multi-FF48 industry experienced partner (*MUL_IND_3Y*) over the past 3 years. The average percentage a client firm has an audit partner with complex industry experience over the past 3 years is 69.9% (*COMPLEX_EXP_3Y*). Over half of client firms are clients of big 4 audit firms (63.8% in *BIG_4*).

Our clients number variable (*NUM_CLIENT_3Y*) takes the number of clients within a specific industry for the past 3 years. In Panel B, we show the description of the number of industry and clients at the unique partner level. To identify the partner-client relationship based on relatively reliable datasets, Panel B is calculated based on original Form AP after cleaning duplicates and excluding observations that do not have SIC code. There are 29,253 partner-year observations. The average industry number an audit partner experienced per year is 1.56. Flasher & Schmutte (2019) report that the client portfolios among Big 4 audit firms are not homogeneous. And Francis et al. (2014) find that earnings of pairs of companies that audited by different big 4 audit firms are less comparable. The literature indicates that each audit firm has its unique characteristics and client portfolios. Therefore, we divided the sample into Big-4 group and non-Big 4 group. Partners from Big-4 audit firms have 1.32 industries per year on average, while non-Big 4 audit firms' partners have 1.93 industries per year. We also compare the client number for partner-years observations. Big 4 partners have 1.68 listed clients per year on average, and non-Big 4 partners have 2.75 listed clients per year.

Table 3: Descriptive statistic for understanding general industry experience

Table 4 shows descriptive statistics for observations used in the OLS regression. The mean values of absolute value (*ABS_DA*) and positive discretionary accruals (*DA_ABOVE*) is 0.089 and 0.081 respectively. 12.8% of 4,425 observations in our sample are found to be suspect based on Cunningham et al. (2019). Around 7.8% of client firms report a restatement (*RESTATEMENT*).

Table 4: Descriptive statistic for OLS and logistic regression models

5. VALIDITY TESTS

5.1 Determinants of General Industry Knowledge

We investigate what factors are correlated with our measure of audit partner general industry knowledge. Table 5 presents the regression results for the impact of determinants on general industry knowledge (*GINDK*). Most of our variables are calculated based on a 3-years duration. We assume that audit partner remains in the same audit firm for the 3-year period[6]. Additionally, we exclude control variables which are used in standard OLS regression model, including client characteristics and audit firm characteristics, because those variables are measured at year *t*. It is unreasonable to explain that client characteristic at year *t* can have an impact on audit partner experience over the past 3 years.

Consistent with our expectations, client number indicators (*NUM_CLIENT_3Y*), partner expertise (*PAR_EXPERTISE_3Y*), complex clients (*MUL_IND_3Y*), and big_4 audit firms (*BIG_4*) are positively correlated with general industry knowledge at 1% (5% for one variable) significant level. 1 percent of increase in audit partner's industry market share leads to 0.365% increase in general industry knowledge. One more client of audit partners brings an increase in 0.03% higher general industry knowledge.

[6] We found 65 partners who change audit firm with 113 client-firm observations. The number is too small to regress in our study. Furthermore, this is not the primary interest variable. Therefore, we decide to omit these situations.

Partners with multi-industry client firms experience show 0.012% higher general industry knowledge. Big 4 partners have 0.238% higher general industry knowledge. We do not observe a significant correlation between complex industry experience and general industry experience (*COMPLEX_EXP_3Y*). One reason can be the classification of complex industry is based on key accounting issues in AICPA/FASB guidance (Francis & Gunn, 2017), which influence a specific accounting topic, but not the accumulated number of accounting topics.

Table 5: Determinants of general industry knowledge

5.2 Determinants of Accounting Topics Disclosure

We then investigate the factors of a companies' number of accounting topics and how this disclosure issue relates to audit quality. Table 6 displays the OLS regression results for factors of companies' topics number. In this regression model, our analysis is based on the data per client firm per year. Therefore, we include observations as much as possible (17,254 observations) from 2016 to 2022 to investigate the relationship. The results show that the size of the client firm (*SIZE*), having a loss (*LOSS*), and the number of business segments (*BUSSEG*) are positively related to the number of accounting topics disclosed by a client firm. Additionally, if there is reported material weakness under SOX 404, the client firms have more accounting topics in financial statements Item 8 for that year. Our results indicate that the scale and complexity of the client firms leads to the increasing of accounting topics number. We do not find evidence of the effect of audit firm (*BIG_4*). Our findings are similar to the results of Dyer et al., (2017), who report that the length of 10-K is positively associated with size, complexity, Big-N auditor, market-to-book, leverage, and loss.

Table 6: Determinants of the number of accounting topics for a given firm year

5.3 The Impact of Number of Accounting Topics on Audit Quality

Table 7 shows the OLS and logistic regression results for the relationship between audit quality and the number of accounting topics per client firm per year. We find that the number of accounting topics of a client firm is positively correlated with absolute discretionary accruals (*ABS_DA*) at a 1% significant level. When a client firm discloses 1 more accounting topic, the discretionary accruals increase 0.001. Our results are consistent when the proxies of audit quality are material weakness (*INCONSIS_MW*) and restatements (*RESTATEMENT*), with coefficients of 0.028 and 0.03, respectively. This finding is consistent with the results of Abernathy et al. (2019), who report a negative correlation between financial statement readability and audit quality, proxied by the first going concern opinion. Combining with the results in Table 6, we believe that the number of accounting topics disclosed by client firms shares similar characteristics with financial statement complexity and the larger number of disclosed accounting topics is correlated with lower audit quality. If we observe a different impact of new measurement calculating at the audit partner level on audit quality, it suggests that our new measurement differs from financial statement disclosure characteristics.

Table 7: Regression for audit quality and the number of accounting topics

6. EMPIRICAL TESTS

6.1 The Effect of Audit Partners' General Industry Knowledge

To examine our hypothesis, we use the observations from 2019 to 2022, and audit partners have industry experience (8,279 observations). Table 8 displays the OLS and logistic regression results for equation (2). We find some evidence to support our hypothesis that audit partners with more general industry knowledge have better audit quality. From columns (1) and (2), there are two dependent variables from performance-matched discretionary accruals based on the modified Jones model (Kothari et al., 2005). We find a negative significant coefficient on general industry knowledge (*GINDK*) for both *ABS_DA* and *DA_ABOVE* models both at a 1% level. The coefficient

indicates that the general industry knowledge of audit partners increases by 1 percent, and the absolute discretionary accruals decrease around 0.126 (0.081 for positive value). We use the logistic regression models for the other two audit quality proxies in columns (3) and (4). The results show a positively significant correlation with *GINDK* at a 5% level for *INCONSIS_MW* (the log odds of an inconsistent material weakness opinion occurring decrease by 4.289) while no significant result was found for *RESTATEMENT*. Even we include the number of accounting topics of client firms (*CIK_TOPIC*) in the main regression, we still find positive association between *CIK_TOPIC* and audit quality. This further suggests that our measure is not driven by disclosure complexity.

Table 8: Audit quality and general industry knowledge

Overall, we find evidence for the negative correlation between discretionary accruals and inconsistent material weakness opinion and general industry knowledge, implying that audit partners experienced more accounting topics knowledge within industry are likely to have higher audit quality. The positive impact of general industry knowledge on audit quality contrasts with the negative impact of *CIK_TOPIC* on audit quality we previously examined, aligning with our expectation. Furthermore, as we find that our new measurement captures different situations of experience that may provide various knowledge for audit partners, we tend to believe that *GINDK* captures the impact of audit partner's knowledge to some extent. We recognize that our measurement only captures part of effect of general industry knowledge.

6.2 Sensitivity Tests

6.2.1 Changing the duration of calculating general industry knowledge

We construct our independent variable based on a 3 years duration, which is derived from the argument that knowledge accumulates through experience (Yelle, 1979). Due to data availability limitations (Form AP data starts from 2017), we could only collect audit partner samples from 2016 to 2022. The 3-year duration is considered

appropriate for our datasets. To address concerns that our results might be influenced by the length of the duration, we test our model with an independent variable based on an accumulated number of accounting topics at the audit partner level. The final sample is from 2017-2022. The maximum length of time for accumulating industry-specific knowledge is five years. After examining our model with accumulated general industry knowledge, we find similar regression results with Table 8.

6.2.2 Excluding employee benefit plan experience

We treat the experience of auditing employee benefit plans as industry experience as well because Prentice et al. (2023) indicate that audit firms are engaged for both audit services and non-audit services have better audit quality[7]. Those services offer more chances to gain insights into the client and their operational environment through increased interaction with the client's staff and accounting systems (Prentice et al., 2023). However, prior research also finds that there is no correlation between non-audit services and audit quality (DeFond et al., 2002). Therefore, we exclude employee benefit plan experiences, recalculate the key variable, and revise the number of observations. We still find negatively significant results for dependent variables *ABS_DA* and *DA_ABOVE* at 1% level and *INCONSIS_MW* at 5% level. This result further supports that our new measure is robust.

6.3 The Effect of Complex Client Firm

We further explore whether audit partner's general industry knowledge performs differently for complex client firm. We define complex client firm as client firms with more than one SIC codes in three databases (COMPUSTAT, Audit Analytics, and XBRL). We double-checked that it exists that one client company can be allocated to different industry because the transaction in the company is complex. Gramling &

[7] We do not consider other types of non-audit services because the Form AP only includes four types of audit report: 1. Employee Benefit Plan; 2. Investment Company; 3. Issuer, other than Employee Benefit Plan or Investment Company; 4. Other than Employee Benefit Plan or Investment Company. The second type, Investment company, is excluded because we exclude financial sectors at all stage of analysis. The fourth type only contains 1 line of data. Therefore, we only identify the first type of audit report as the non-audit services that might contain industry knowledge.

Stone (2001) mentioned this situation that for conglomerate companies, their revenue comes from various sources, and it is unreasonable to be categorized into a particular industry. Therefore, we collect the SIC codes from all databases we used and construct a variable to indicate the company that can be categorized into more than one Fama-French 48 industries. Our primary selected SIC code in the main regressions comes from Audit Analytics. We treat it as the main industry the client firm belongs to. The effect of general industry knowledge may decrease because the complex economic situation of client firms may require cross-industry knowledge, not highly concentrated in a specific industry.

Table 9: The effect of complex client company

Table 9 displays the regressions with interaction terms *GINDK*MORE_FF48*. We do not find evidence for dependent variables *ABS_DA*, *DA_ABOVE* and *INCONSIS_MW* that general industry knowledge benefits audit quality when the client firms are complex. The regression results in column (4) are a new finding for us because we do not observe a significant correlation between restatement and general industry knowledge in prior regression models. The general industry knowledge only shows impact on decreasing the probability of restatement when the client firms belong to several industries. Therefore, we do not find consistent evidence to support that it is beneficial for complex client firms if they engage audit partners who show greater general industry knowledge in a specific industry.

7. DISCUSSION AND CONCLUSION

We investigate the impact of audit partners' industry knowledge on audit quality, utilizing audit partner identification disclosed in Form AP. We focus on the dimension of acquired knowledge from industry experience and develop a measure of general industry knowledge for audit partners, based on the range of accounting topics they have encountered. To establish a proxy for an audit partner’s general industry

knowledge, we utilize XBRL tags to identify the accounting topics disclosed by client firms, then calculate the cumulative industry knowledge of the audit partner for each industry.

We validate our new measurement through three regression models, documenting the determinants of an audit partner's general industry knowledge. Our findings indicate that audit partners with higher market share, a larger number of clients, more complex client firms, and affiliation with Big 4 audit firms possess greater general industry knowledge. Additionally, we identify the factors determining the number of accounting topics disclosed by client companies. To ensure our new measure captures elements distinct from client companies' disclosure complexity, we analyze the impact of the number of accounting topics disclosed by a client in a year on our audit quality proxies. Our regression results reveal that client firms disclosing the greatest number of accounting topics tend to have lower audit quality.

Finally, we examine whether general industry knowledge of audit partners can improve audit quality. We find consistent results using discretionary accruals and inconsistent internal control weaknesses as proxies for audit quality, suggesting that greater general industry knowledge is associated with lower discretionary accruals and a reduced probability of issuing an inconsistent internal control weaknesses opinion.

We acknowledge several limitations in our study. Firstly, our focus on publicly listed companies excludes numerous private firms that also contribute to an audit partner's industry experience. Secondly, our proxy captures only a portion of the general industry knowledge an audit partner acquires; other aspects of industry knowledge might also impact audit quality. Given that this research into general industry knowledge is in its early stages, a more refined proxy or a deeper understanding of industry experience could yield different findings. Thirdly, our sample period spans from 2019 to 2022, and we test our results on industry experience over a three-year calculation and an accumulated calculation for an additional test. A broader sample and data covering a longer period might yield different results. Lastly, while we detect a correlation between industry knowledge and audit quality, we do not infer causality.

Researchers have called for more evidence at the audit partner level (Cameran et al., 2022; Francis, 2023). Our study delves into the impact of audit partners' industry expertise from a knowledge perspective. Our findings provide valuable insights for both audit and client firms aiming to enhance audit quality at the partner level. Audit firms might consider strategically assigning audit tasks to partners with relevant experience, while client firms could select partners who meet specific criteria. We encourage future research to further explore the nuances of industry experience at the audit partner level, as understanding this aspect could be key to improving overall audit quality and effectiveness.

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Table 1: Number of accounting topics per firm within each industry

FF48	Industry name	Observations	Client-firms (per year)							Industry Total (year mean)
			Mean	SD	Min	p25	p50	p75	Max	
1	Agriculture	65	36	8.74	16	33	35	41	54	86
2	Food Products	220	35	5.81	18	32	35.5	39	51	96
3	Candy & Soda	49	35	6.2	19	31	35	39	43	77
4	Beer & Liquor	49	35	5.76	22	32	35	40	48	84
6	Recreation	108	38	6.46	20	33	39	42.5	49	83
7	Entertainment	274	35	5.66	16	33	37	39	51	100
8	Printing and Publishing	63	39	5.44	29	35	38	43	53	79
9	Consumer Goods	270	37	5.94	21	33	38	41	51	96
10	Apparel	82	37	3.79	28	33	37	40	44	81
11	Healthcare	425	35	5.58	22	31	36	39	53	101
12	Medical Equipment	940	36	5.67	17	32	36	40	54	111
13	Pharmaceutical Products	2,687	34	5.57	13	30	34	38	52	118
14	Chemicals	504	39	5.39	17	37	39	43	53	104
15	Rubber and Plastic Products	94	37	5.5	21	35	37.5	40	47	83
17	Construction Materials	313	36	5.99	22	32	36	41	53	96
18	Construction	293	36	5.53	12	33	36	40	52	100
19	Steel Works Etc	188	36	4.58	19	33	37	39	44	84
21	Machinery	590	38	5.45	13	34	38	41	50	104
22	Electrical Equipment	297	36	4.89	19	33	37	40	47	98
23	Automobiles and Trucks	328	39	5.92	18	35	39	43	57	103
24	Aircraft	107	37	4.19	25	35	38	40	45	86
25	Shipbuilding, Railroad Equipment	26	35	4.07	25	33	36	38	40	77
26	Defense	21	38	4.7	32	34	37	41	47	77
27	Precious Metals	63	36	4.97	24	33	35	37	50	85
28	Non-Metallic and Industrial Metal Mining	130	35	5.81	21	31	35	39	46	91

29	Coal	72	36	5.77	25	31	36.5	39.5	47	77
30	Petroleum and Natural Gas	975	35	6.11	14	31	34	38	53	110
31	Utilities	613	38	6.76	21	34	38	42	61	107
32	Communication	467	37	5.12	23	34	37	41	51	105
33	Personal Services	197	36	5.41	21	32	35	39	51	99
34	Business Services	3,070	37	5.88	11	33	37	40	63	119
35	Computers	322	39	5.69	15	35	39	43	55	97
36	Electronic Equipment	815	38	5.7	10	34	38	42	54	109
37	Measuring and Control Equipment	350	37	5.69	21	35	38	41	50	97
38	Business Supplies	137	38	5.71	28	34	39	43	51	89
39	Shipping Containers	49	39	4.16	31	37	40	41	47	81
40	Transportation	558	34	4.79	24	30	33	36	52	108
41	Wholesale	591	36	5.17	19	33	37	40	50	110
42	Retail	415	36	4.56	20	33	36	39	48	107
43	Restaurants, Hotels, Motels	166	37	5.2	19	33	37	41	48	94
48	Other	271	37	7.95	13	32	37	41	56	105
	Full Sample	17,254	36	5.88	10	32	36	40	63	108

Notes: This table describes the number of accounting topics disclosed by each client per year with industries categorized according to the Fama-French 48 industry classifications, using 17,254 observations from the period 2016 to 2022. Our detailed list of accounting topics is provided in Appendix A. Client-firms columns describe the number of accounting topics disclosed by a company per year. The industry total column takes the average of the sum of unique accounting topics within a specific industry per year. We utilize XBRL text tags to identify the accounting topics. When related text tags are mentioned in a firm's financial statements, the corresponding accounting topic is counted as 1. Some industries are omitted, and some have fewer than 10 observations, primarily because the calculation of discretionary accruals is restricted to industries with at least ten observations. In certain industries, only 1 or 2 years have more than 10 observations.

Table 2: Sample selection

Panel A: Sample selection	client-years	unique clients	unique partners
U.S. observations without duplicates in Form AP from PCAOB during January 31, 2017 and March 1st 2024	86,931	24,349	7,579
Less: Missing XBRL coverage	(49,040)	(15,402)	(1,947)
Less: Missing Compustat or Audit Analytics coverage (for fiscal years 2016-2022)	(10,511)	(3,028)	(1,019)
Less: Missing data for all control variables	(4,679)	(924)	(598)
Less: Financial sectors (Fama French 48 industry code from 44 to 47)	(5,447)	(880)	(811)
Final Sample for Accounting topic analysis (fiscal years 2016-2022)	17,254	4,115	3,204
Less: Data for fiscal years 2016-2018	(7,107)	(651)	(591)
Less: audit partners that do not have clients in a specific industry for the past 3 years	(1,868)	(146)	(301)
Final Sample for general industry knowledge (fiscal years 2019-2022)	8,279	3,318	2,312

Panel B: Sample distribution by year

Year	client-years	unique partners
2016	2,232	1,541
2017	2,470	1,656
2018	2,405	1,643
2019	2,368	1,631
2020	2,410	1,645
2021	2,635	1,773
2022	2,734	1,803
Total	17,254	3,204

Notes: Our dataset was collected up to March 1st, 2024 in Compustat, Audit Analytics in WRDS (Wharton Research Data Services), and XBRL tags from the Financial Statement and Notes Data Sets.

Table 3: Descriptive statistic for understanding general industry experience

Panel A: Descriptive statistic for determinants of general industry knowledge experience						
Variable	N	Mean	SD	p25	p50	p75
Variables of interest						
GINDK	8,279	0.351	0.115	0.305	0.362	0.421
CIK_TOPIC	17,254	36.18	5.88	32	36	40
Determinants						
PAR_EXPERTISE_3Y	8,279	0.01	0.029	0.001	0.002	0.008
NUM_CLIENT_3Y	8,279	1.866	2.237	1	1	2
MUL_IND_3Y	8,279	0.701	0.458	0	1	1
COMPLEX_EXP_3Y	8,279	0.699	0.459	0	1	1
BIG_4	8,279	0.638	0.481	0	1	1

Panel B: Description at the unique partner level						
	N	Mean	SD	p25	p50	p75
Industry number per partner per year						
All observations	29,253	1.56	1.33	1	1	2
Big 4 group	17,717	1.32	0.62	1	1	2
Non-Big 4 group	11,536	1.93	1.92	1	1	2
Client number per partner per year						
All observations	29,253	2.10	3.17	1	1	2
Big 4 group	17,717	1.68	1.08	1	1	2
Non-Big 4 group	11,536	2.75	4.80	1	2	3

Notes: Panel A presents the descriptive statistics for variables that serve as determinants of general industry experience during the period from 2019 to 2022. The general industry knowledge (*GINDK*) is the sum of accounting topics used by an audit partner over the past three years in the client's industry (based on Fama-French 48 industry classifications), divided by the total number of accounting topics for the client's industry within those three years. *CIK_TOPIC* includes observations from 2016 to 2022. Panel B is calculated based on original Form AP after cleaning duplicates and excluding observations that do not have SIC code. The definitions of variables are in Appendix B. The value for partner expertise over the past three years (*PAR_EXPERTISE_3Y*) may be zero due to the absence of audit fee data for the employee benefit plan audit services.

Table 4: Descriptive statistic for OLS and logistic regression models

Variable	N	Mean	SD	p25	p50	p75
Audit quality variables						
ABS_DA	8,279	0.089	0.108	0.023	0.053	0.11
DA_ABOVE	4,589	0.081	0.089	0.025	0.054	0.104
INCONSIS_MW	4,425	0.128	0.334	0	0	0
RESTATEMENT	8,279	0.078	0.269	0	0	0
Variables of interest						
GINDK	8,279	0.351	0.115	0.305	0.362	0.421
Control variables - audit firm level						
TENURE	8,279	7.517	4.15	4	7	11
BIG_4	8,279	0.638	0.481	0	1	1
Control variables - client company						
SIZE	8,279	6.417	2.594	4.77	6.653	8.203
LEV	8,279	0.409	0.83	0.099	0.285	0.459
LOSS	8,279	0.519	0.5	0	1	1
SALE_GROWTH	8,279	0.352	1.33	-0.057	0.09	0.298
BTMR	8,279	0.375	1.037	0.126	0.33	0.647
CFO	8,279	-0.097	0.544	-0.113	0.042	0.102
ROA	8,279	-0.341	1.69	-0.253	-0.008	0.059
BUSSEG	8,279	1.973	1.721	1	1	3
YEAR_END	8,279	0.839	0.367	1	1	1
ROTATION	8,279	0.097	0.296	0	0	0
COMPLEX	8,279	0.425	0.494	0	0	1
LAG_ACC	8,279	-0.151	0.919	-0.077	-0.018	0.013
MW	8,279	0.043	0.202	0	0	0
GC	8,279	0.117	0.321	0	0	0

Notes: This table presents the descriptive statistics for the OLS and logistic regression models covering the period from 2019 to 2022. The definition of variables is in Appendix B. To minimize the impact of outliers, all continuous variables about client characteristics are winsorized at the 1st and 99th percentiles. The number of observations for our primary interest variable is the same as that applied in the regression model.

Table 5: Determinants of general industry knowledge

	GINDK
PAR_EXPERTISE_3Y	0.365***
	(2.67)
NUM_CLIENT_3Y	0.030***
	(7.33)
MUL_IND_3Y	0.012**
	(2.53)
COMPLEX_EXP_3Y	0.003
	(0.51)
BIG_4	0.238***
	(12.29)
Fixed effects	Year, Industry, Partner
N	8,279
Number of cik	3,318
adj. R2	0.510

Notes: This table presents the regression results exploring the relationship between potential determinants and general industry knowledge. The analysis uses observations from 2019 to 2022 and includes only those audit partners who have industry clients for the past 3 years. The general industry knowledge is the sum of accounting topics used by an audit partner over the past three years in the client's industry, divided by the total number of accounting topics for the client's industry within those three years. Robust standard errors are clustered by firm, and t-statistics are shown in parentheses below the coefficient. The definition of variables is in Appendix B. ***, **, * Indicate significance at the 1 percent, 5 percent, and 10 percent levels, respectively

Table 6: Determinants of the number of accounting topics for a given firm year

	CIK_TOPIC
BIG_4	0.107
	(0.41)
SIZE	0.906***
	(10.83)
LEV	0.116
	(1.54)
LOSS	0.205***
	(3.35)
SALE_GROWTH	-0.015
	(-0.71)
BTMR	-0.023
	(-0.64)
CFO	-0.222**
	(-2.15)
ROA	0.050**
	(2.24)
BUSSEG	0.131***
	(3.34)
YEAR_END	0.836
	(1.39)
ROTATION	0.040
	(1.01)
LAG_ACC	-0.008
	(-0.19)
MW	0.365***
	(3.02)
GC	0.429***
	(3.18)
RESTATEMENT	-0.160*
	(-1.85)
Fixed effects	Year & Industry
N	17,254
Number of cik	4,115
adj. R2	0.112

Notes: This table outlines the regression results analyzing the relationship between potential determinants and the number of accounting topics disclosed by client firms, using 17,254 observations from the period 2016 to 2022. Robust standard errors are clustered by client firm, and t-statistics are shown in parentheses below the coefficient. The definition of variables is in Appendix B. ***, **, * Indicate significance at the 1 percent, 5 percent, and 10 percent levels, respectively.

Table 7: Regression for audit quality and the number of accounting topics

	(1)	(2)	(3)	(4)
	ABS_DA	*DA_ABOVE*	*INCONSIS_MW*	*RESTATEMENT*
CIK_TOPIC	0.001***	0.001	0.028***	0.030***
	(2.85)	(1.61)	(4.00)	(5.81)
TENURE	0.000	0.000	-0.079***	-0.040***
	(0.08)	(0.83)	(-7.65)	(-4.78)
BIG_4	0.010	0.001	0.272***	-0.613***
	(1.37)	(0.09)	(3.01)	(-8.93)
SIZE	-0.011***	-0.009**	-0.212***	0.049***
	(-3.62)	(-2.46)	(-7.24)	(2.85)
LEV	0.001	-0.001	0.128*	-0.029
	(0.41)	(-0.18)	(1.95)	(-0.71)
LOSS	-0.001	-0.032***	0.328***	0.172***
	(-0.29)	(-10.47)	(4.21)	(2.83)
SALE_GROWTH	0.008***	0.005***	0.029	0.003
	(6.62)	(3.77)	(1.21)	(0.15)
BTMR	-0.004***	-0.001	0.028	0.008
	(-2.61)	(-0.31)	(0.80)	(0.29)
CFO	0.013**	-0.035***	0.241**	0.040
	(2.48)	(-2.87)	(2.31)	(0.57)
ROA	0.003*	0.020***	-0.016	-0.010
	(1.89)	(2.60)	(-0.40)	(-0.51)
BUSSEG	-0.000	-0.000	0.028	0.054***
	(-0.41)	(-0.38)	(1.31)	(3.73)
YEAR_END	-0.029	-0.016	0.129	-0.035
	(-1.09)	(-0.42)	(1.23)	(-0.49)
ROTATION	0.001	-0.001	0.188**	0.017
	(0.61)	(-0.34)	(2.48)	(0.27)
LAG_ACC	-0.003	-0.030***	-0.000	-0.053
	(-1.24)	(-5.48)	(-0.00)	(-1.57)
MW	0.004	0.007**		1.249***
	(1.18)	(2.17)		(14.13)
GC	0.005	-0.006	0.878***	-0.031
	(0.87)	(-0.79)	(7.31)	(-0.31)
RESTATEMENT	0.003	0.003	0.705***	
	(1.13)	(1.17)	(7.27)	
Constant	0.128***	0.127***	-1.239***	-3.710***
	(3.99)	(3.01)	(-3.47)	(-5.82)
Fixed effects			Year & Industry	
N	17,254	9,480	9,048	17,254
adj. R2/Pseudo R2	0.024	0.108	0.09	0.076

Notes: This table outlines the regression results analyzing the relationship between the number of accounting topics disclosed by client firms and audit quality, using 17,254 observations from the period 2016 to 2022. Columns (1) and (2) display the results of OLS regressions, while columns (3) and (4) show the outcomes of logistic regressions. Robust standard errors are clustered by client firm, and t-statistics are shown in parentheses below the coefficient.

The definition of variables is in Appendix B. ***, **, * Indicate significance at the 1 percent, 5 percent, and 10 percent levels, respectively.

Table 8: Audit quality and general industry knowledge

	(1) *ABS_DA*	(2) *DA_ABOVE*	(3) *INCONSIS_MW*	(4) *RESTATEMENT*
GINDK	-0.126***	-0.081***	-4.289**	-0.256
	(-4.52)	(-3.08)	(-2.32)	(-0.34)
CIK_TOPIC	0.000	0.001	0.066**	0.039**
	(0.25)	(1.09)	(2.11)	(2.19)
PAR_IND_LEADER	-0.006	-0.009	0.359	0.561
	(-0.90)	(-0.79)	(0.31)	(0.57)
TENURE	0.001	0.004	-0.179***	-0.082***
	(0.63)	(1.07)	(-4.35)	(-2.96)
BIG_4	-0.088***	-0.090**	-33.000***	0.115
	(-3.29)	(-2.13)	(-2.86)	(0.05)
SIZE	-0.003	-0.008	0.001	-0.014
	(-0.38)	(-0.81)	(0.01)	(-0.18)
LEV	0.003	0.002	0.854***	0.105
	(0.41)	(0.11)	(2.74)	(0.90)
LOSS	-0.008*	-0.033***	0.170	0.467**
	(-1.85)	(-5.57)	(0.62)	(2.48)
SALE_GROWTH	0.009***	0.004**	-0.132*	0.035
	(4.28)	(2.09)	(-1.79)	(0.70)
BTMR	-0.009***	-0.004	-0.085	0.189**
	(-2.59)	(-0.80)	(-0.68)	(2.23)
CFO	-0.004	0.003	1.197***	0.097
	(-0.28)	(0.16)	(2.70)	(0.55)
ROA	0.003	0.032**	-0.244	-0.007
	(1.29)	(2.17)	(-1.53)	(-0.15)
BUSSEG	-0.001	0.000	-0.106	0.187***
	(-0.71)	(0.11)	(-1.00)	(3.55)
YEAR_END	-0.016	0.026	-0.668	-0.615**
	(-0.39)	(0.37)	(-1.56)	(-2.43)
ROTATION	-0.020***	-0.011*	-0.307	-0.215
	(-2.92)	(-1.67)	(-0.92)	(-0.91)
LAG_ACC	-0.005	-0.060***	-0.196	-0.163**
	(-0.98)	(-2.75)	(-1.24)	(-2.02)
MW	0.011	0.016*		1.445***
	(1.56)	(1.79)		(5.28)
GC	-0.014	-0.026*	1.904***	-0.051
	(-1.13)	(-1.81)	(4.34)	(-0.18)
RESTATEMENT	0.007	0.005	1.156***	
	(0.89)	(0.66)	(3.13)	
Constant	0.215***	0.150*	-0.192	-3.383
	(3.10)	(1.75)	(-0.04)	(-1.59)
Fixed effects		Year, Industry, Partner		
N	8,279	4,589	1,057	1,982
adj. R2/Pseudo R2	0.24	0.39	0.3	0.224

Notes: This table presents the regression results exploring the relationship between general industry knowledge and

audit quality. The analysis uses observations from 2019 to 2022 and includes only those audit partners who have industry clients for the past 3 years. The general industry knowledge is the sum of accounting topics used by an audit partner over the past three years in the client's industry, divided by the total number of accounting topics for the client's industry within those three years. Columns (1) and (2) display the results of OLS regressions, while columns (3) and (4) show the outcomes of logistic regressions. Robust standard errors are clustered by client firm, and t-statistics are shown in parentheses below the coefficient. The definition of variables is in Appendix B. ***, **, * Indicate significance at the 1 percent, 5 percent, and 10 percent levels, respectively.

Table 9: The effect of complex client company

	(1) *ABS_DA*	(2) *DA_ABOVE*	(3) *INCONSIS_MW*	(4) *RESTATEMENT*
GINDK	-0.140***	-0.092***	-4.521**	1.237
	(-4.45)	(-2.95)	(-2.29)	(1.37)
MORE_FF48	0.022	-0.023	-1.616	1.659***
	(0.51)	(-0.74)	(-1.27)	(3.15)
*GINDK*MORE_FF48*	0.069	0.042	2.443	-3.440**
	(1.23)	(0.88)	(0.77)	(-2.49)
Fixed effects	Year, Industry, Partner			
Control variables	Yes	Yes	Yes	Yes
N	8,279	4,589	1,057	1,982
adj. R2/Pseudo R2	0.241	0.39	0.303	0.229

Notes: This table displays the regression results exploring whether the complexity of client firms would influence the effect general industry knowledge on audit quality. The analysis uses observations from 2019 to 2022 and includes only those audit partners who have industry clients for the past 3 years. The general industry knowledge is the sum of accounting topics used by an audit partner over the past three years in the client's industry, divided by the total number of accounting topics for the client's industry within those three years. Complexity of client firms is proxied by whether the client firm has several industry code based on Fama-French 48 industry classifications. Columns (1) and (2) display the results of OLS regressions, while columns (3) and (4) show the outcomes of logistic regressions. Robust standard errors are clustered by client firm, and t-statistics are shown in parentheses below the coefficient. The definition of variables is in Appendix B. ***, **, * Indicate significance at the 1 percent, 5 percent, and 10 percent levels, respectively.

Appendix A: List of accounting topics

Definition[8]

accounting changes and error corrections
asset retirement obligations
balance sheet offsetting
business combinations
business combinations and asset acquisitions
cash and cash equivalents
commitment and contingencies
compensation related costs, general
compensation related costs, post employment benefits
compensation related costs, retirement benefits
compensation related costs, share based payments
contractors
credit losses
debt
deferred costs, capitalized, prepaid, and other assets
derivative instruments and hedging activities
development stage enterprises
discontinued operations and disposal groups
earnings per share
environmental remediation obligations
equity
extractive industries
extraordinary and unusual items
fair value measures and disclosures
financial services, banking and thrift
financial services, brokers and dealers
financial services, federal home loan banks
financial services, insurance
financial services, investment company
financial services, mortgage banking
foreign operations and currency translation
government assistance
guarantees
health care organizations
income taxes
intangible assets, goodwill and other
interim reporting
inventory
investment holdings
investments federal income tax note
investments in and advances to affiliates
investments sold not yet purchased

[8] Each definition is considered as an accounting topic (except 290000-Disclosure-Accounting Policies and 195000 - Disclosure - Comprehensive Text Block List). The second level of tags within "290000-Disclosure-Accounting Policies" are included as an additional resource for identifying accounting topics. This is due to the fact that many of these categories refer to other definition topics. Therefore, for each year, we have two lists of accounting topic, and the count of accounting topic is aggregated to determine the total number of topics used by an auditor.

investments, all other investments
investments, debt and equity securities
investments, equity method and joint ventures
leases
non controlling interest
non monetary transactions
open option contracts written
organization, consolidation and presentation of financial statements
other income and expenses
other industries
other liabilities
other than securities investment holdings
payables and accruals
property, plant, and equipment
real estate
receivables, loans, notes receivable, and others
regulated operations
related party disclosures
reorganizations
research and development
restructuring and related activities
revenue from contract with customer
revenue recognition and deferred revenue
risks and uncertainties
segment reporting
subsequent events
summary of investment holdings
temporary equity
transfers and servicing
unusual or infrequently occurring items

Accounting policies

Advertising costs policy text block
Asset retirement obligations and environmental cost policy text block
Basis of accounting policy policy text block
Basis of presentation and significant accounting policies text block
Business combinations and other purchase of business transactions policy text block
Business description and accounting policies text block
Business description and basis of presentation text block
Cash and cash equivalents policy text block
Collaborative arrangement accounting policy
Commissions expense policy policy text block
Commitments and contingencies policy text block
Compensation related costs policy text block
Comprehensive income policy policy text block
Concentration risk credit risk
Cost of sales policy text block
Costs associated with exit or disposal activities or restructurings policy text block
Credit card origination costs policy text block
Debt policy text block
Deferred charges policy text block
Depreciation depletion and amortization policy text block

Derivatives policy text block
Discontinued operations policy text block
Earnings per share policy text block
Equity securities without readily determinable fair value policy text block
Fair value measurement policy policy text block
Foreign currency transactions and translations policy text block
Frequent flier program policy policy text block
Goodwill and intangible assets policy text block
Government assistance policy text block
Impairment or disposal of longlived assets including intangible assets policy policy text block
Impairment or disposal of longlived assets policy text block
Income tax policy text block
Industry specific policies abstract
Interest capitalization policy policy text block
Interest expense policy text block
Inventory policy text block
Investment policy text block
Lease policy text block
Legal costs policy text block
Lessee leases policy text block
Lessor leases policy text block
Maintenance cost policy policy text block
Major customers policy policy text block
Off balance sheet credit exposure policy policy text block
Organization consolidation and presentation of financial statements disclosure text block
Pre contract costs policy text block
Property plant and equipment policy text block
Push down accounting policy text block
Receivables policy text block
Related parties amount in cost of sales
Research development and computer software policy text block
Revenue different transition method policy text block
Revenue from contract with customer policy text block
Revenue recognition cargo and freight policy policy text block
Revenue recognition dividends
Revenue recognition interest
Revenue recognition leases
Revenue recognition policy text block
Revenue recognition regional carriers and passengers policy policy text block
Revenue transaction price measurement tax exclusion policy text block
Sale lease back transactions policy
Segment reporting policy policy text block
Self insurance reserve policy text block
Selling general and administrative expenses policy text block
Separation of lease and non lease components policy text block
Shares subject to mandatory redemption changes in redemption value policy tex tblock
Shipping and handling cost policy text block
Short term leases policy text block
Stock holders equity policy text block
Subsequent events policy policy text block
Transfers and servicing of financial assets policy text block

Appendix B: Definition of variables

Variables	Definition
Audit quality variables	
ABS_DA	The absolute value of performance-adjusted abnormal accruals based on the modified Jones model following Kothari et al. (2005). We estimate the regression annually for each industry based on Fama-French 48 industry classifications, requiring at least ten observations per industry. $AC_{it} = \alpha + \beta_0(1/AT_{it-1}) + \beta_1 \Delta REV_{it} + \beta_2 PPE_{it} + \beta_3 ROA_{it-1} + \varepsilon_{it}$ where: AC_{it} is total accruals for firm *i* in year *t*, defined as net income from continuing operations minus operating cash flow scaled by total assets at the end of year *t-1*; AT_{it-1} is total assets for firm *i* at the end of year *t-1*; $\triangle REV_{it}$ is the change in revenue for firm *i* at the end of year *t* scaled by total assets at the end of year *t-1*; PPE_{it} is net property, plant, and equipment for firm i at the end of year *t* scaled by total assets at the end of year *t-1*; and ROA_{it-1} is net income for firm *i* in year *t-1* scaled by total assets at the start of year *t-1*.
DA_ABOVE	The positive value of performance-adjusted abnormal accruals
INCONSIS_MW	1 if the suspect classification and actual audit opinion disclosure for material weaknesses are not equal, and 0 otherwise. We identify ''suspect'' observations if the company's propensity to report a material weakness (''predicted value'') is in the top 10 percent of 404(b) filers by year, based on all companies with an auditor opinion on ICFR and available data in Compustat, following Cunningham et al., (2019) $PredictedValue_{it} = 0.301(AggLoss_{it-1,t}) + 0.940(Misstate_{it-2,t-1}) + 0.072(Seg_{it}) - 0.344(Age_{it}) - 0.714(BankInd_{it}) - 0.361(LogMVE_{it-1}) - 1.088(Cash_{it-1}) - 1.285(InstOwn_{it-1}) + 3.161(MW404b_{it-1})$ where: *AggLoss* is an indicator variable equal to 1 if the sum of IB (in Compustat) across *t* and *t-1* is less than zero, and 0 otherwise; *Misstate* is an indicator equal to 1 if the firm restates its year *t-2* or *t-1* financial statements, and 0 otherwise; *Seg* equals the number of business and geographic segments in year *t*; *Age* equals company age in year *t*; *BankInd* is an indicator variable equal to 1 if the company is in the banking industry in year *t*, and 0 otherwise; *LogMVE* is the natural logarithm of market capitalization in year *t-1*; *Cash* equals the proportion of assets that are cash and cash equivalents in year *t-1*; *InstOwn* equals the proportion of institutional investors in year *t-1*; *MW404b* is an indicator variable equal to 1 if the auditor identifies a material weakness in its auditor's report in year *t-1*, and 0 otherwise; and *i* and *t* are company and year indicators, respectively.
RESTATEMENT	1 if the company announced a restatement during fiscal year *t* (data from Audit Analytics), and 0 otherwise.
Variables of interest	
CIK_TOPIC	The sum of accounting topics used by a client company in year *t*
GINDK	The sum of accounting topics used by an audit partner over the past three years in the client's industry, divided by the total number of accounting topics for the client's industry within those three years
Control variables - audit partner level	
PAR_IND_LEADER	1 if the market share of audit partner at year *t* in the client's Fama and French 48 industries is the first rank, 0 otherwise. Total audit fees charged by the engagement partner in the client's Fama and French 48 industries, divided by the total audit fees for the client's industry
Control variables - audit firm level	
TENURE	The consecutive number of years of the auditor-client relationship (audit firm) through year *t* in Audit Analytics
BIG_4	1 if the auditor is a Big 4 firm (Ernst & Young, PWC, Deloitte, KPMG) in year *t*, and 0 otherwise.
Control variables - client company	
SIZE	Natural logarithm of total assets (AT) at the end of year *t*.
LEV	Total debt (DLC + DLTT) divided by total assets (AT) at the end of year *t*.
LOSS	1 if net income (NI) in year *t* is less than zero, and 0 otherwise.
SALE_GROWTH	The percentage growth in a firm's sales from year *t-1* through year *t*.

BTMR	Firm *i*'s total assets at the end of year *t-1* scaled by the sum of market capitalization plus total assets minus the book value of total common equity as of year-end *t-1*
CFO	Cash flow from operations (OANCF) in year *t* divided by total assets at the end of year *t*.
ROA	Earnings before extraordinary items (IB) in year *t* divided by total assets (AT) at the end of year *t*.
BUSSEG	Number of business segments, from BUSSEG in Compustat SEGMENTS.
YEAR_END	1 if the company's fiscal year-end in year *t* is in December, and 0 otherwise.
ROTATION	1 if the company change audit partner in year *t*
LAG_ACC	Total current accruals (IB + DPC - OANCF) in year *t-1* divided by total assets (AT) at the end of year *t-1*
MW	1 if the company or the auditor disclosed a material weakness under SOX 404(a)/404(b) in year *t*
GC	1 if the firm receives a going-concern opinion, and 0 otherwise (Audit Analytics)

Determinants Variables	Definition
PAR_EXPERTISE_3Y	Total audit fees charged by the engagement partner in the client's Fama-French 48 industries during the past 3 years of year *t*, divided by the total audit fees for the client's industry
NUM_CLIENT_3Y	The number of client companies in an industry within the three-year period preceding time points *t-1*, *t-2*, and *t-3*
MUL_IND_3Y	1 if the partner has audited clients with more than one ff48 industries within the three-year period preceding time points *t-1*, *t-2*, and *t-3*
COMPLEX_EXP_3Y	1 if the partner is engaged by a client belongs to complex industry within the three-year period preceding time points *t-1*, *t-2*, and *t-3*. The client belongs to a complex industry of the client company is in one of the following Fama-French 48 industry codes: 1, 7, 11, 18, 26, 27, 28, 29, 30, 31, 32, 34, 35, 40, 44, 45, 46, or 47; equal to zero otherwise