Audit-Firm Profitability:

Determinants and Implications for Audit Outcomes

Jeff Zeyun Chen

Neeley School of Business, Texas Christian University

zeyun.chen@tcu.edu

Anastasios Elemes

ESSEC Business School

elemes@essec.edu

Ole-Kristian Hope

Rotman School of Management, University of Toronto

okhope@rotman.utoronto.ca

Aaron S. Yoon

Kellogg School of Management, Northwestern University

aaron.yoon@kellogg.northwestern.edu

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Abstract

We use a novel dataset that links *audit-firm* and client-firm financial statement information from the U.K.'s largest audit firms to examine drivers of audit-firm profitability and its implications for audit outcomes. We first explore the determinants of audit-firm profitability and conclude that Big-4 and non-Big-4 audit firms have fundamentally different profitability structures. Big-4 firms earn higher profit margins than non-Big-4 firms. Furthermore, Big-4 profitability increases with client size and complexity, while non-Big-4 profitability is higher for smaller, private-firm clients. Next, we examine the relation between audit-firm profitability and audit outcomes. Using a battery of alternative outcome measures (proxies for financial reporting quality, the propensity to issue a qualified auditor opinion, earnings restatements, and the level of unexpected KAM disclosures) we find that more profitable audit firms deliver higher audit quality. In supplemental analyses we show that the positive relation between audit-firm profitability and audit outcomes is generally stronger for more influential and more levered clients (i.e., when auditors are exposed to more litigation risk). Our results are robust to several endogeneity controls such as controlling for *client-firm* and/or *audit-firm* fixed effects, employing changes specifications, and using an instrumental variables approach. Our study contributes to the literature by being the first to provide insights into audit-firm profitability and examine in detail its implications for audit quality and audit effort.

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1. Introduction

In this study, we examine the determinants of audit-firm profitability and its implications for audit outcomes by using a unique dataset of U.K. audit firms that links *audit-firm* and client-firm financial statement information. Theoretical models in economics suggest that firm profitability is a key performance indicator that significantly affects product quality (Fazzari, Hubbard, and Petersen 1988; Beard 1990; Maksimovic and Titman 1991; Chevalier and Scharfstein 1996). These models have been backed by empirical evidence from a number of industries (Rose 1990; Dionne, Gagné, Gagnon, and Vanasse 1997; Noronha and Singal 2004; Matsa 2011; Phillips and Sertsios 2013; Kini, Shenoy, and Subramaniam 2017). Yet there is virtually no empirical evidence on the drivers of audit firms' profitability as well as on its implications for audit outcome. Our study attempts to fill this void.

Audit firms are private firms. Therefore, the lack of empirical evidence of the association between audit-firm factors and audit outcomes is likely because U.S. audit firms' financial statements are not publicly available. In Europe, however, *all* private firms that meet certain size criteria are subject to mandatory disclosure and audit of their financial statements (Elemes, Blaylock, and Spence 2021). We take advantage of this institutional setting to extend research on audit-firm determinants of audit outcomes beyond auditor size and industry specialization (DeFond and Zhang 2014).

We begin by offering descriptive and exploratory analyses of the determinants of audit-firm profitability. We find that Big-4 firms earn higher profit margins than non-Big-4 firms. Controlling for Big-4 membership, audit firms with more employees exhibit lower profitability while those with higher cash holdings exhibit higher profitability. Perhaps most importantly, we show that Big-4 and non-Big-4 audit firms have fundamentally different profitability structures. We find that Big-4 profitability increases with client complexity (measured by listing status and size), but find that the opposite is true

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for non-Big-4 auditors. The higher the client firms' operating volatility, the lower the Big-4 audit firms' profitability, suggesting that Big-4 auditors devote more audit effort (hence incur more cost) to mitigate their risk exposure. We do not find such a pattern for non-Big-4 audit firms.

Our hypothesis examines the extent to which audit-firm profitability affects audit outcome.[1] We use several commonly used output-based audit quality proxies to infer audit outcome. These proxies include the level of absolute discretionary accruals (Kothari, Leone, and Wasley 2005), the accruals quality measure (Dechow and Dichev 2002; McNichols 2002), the probability of issuing qualified audit opinions, and the likelihood of earnings restatements. In addition to these conventional audit quality measures, we also examine audit outcome from auditors' Key Audit Matter (KAM) disclosures. In 2013, the U.K. became the first country to introduce expanded audit reports that mandate the disclosure of the risks of material misstatements. The audit report has been historically described as boilerplate and uninformative because the audit opinion takes form of a binary outcome (unqualified or qualified) and consists of largely standardized wording. For example, Lennox, Schmidt, and Thomson (2022) observe that most regulators and stock exchanges require companies to receive unqualified opinions. While KAM disclosures represent a direct outcome of the audit process similar to the auditor's opinion, they exhibit more detail and greater cross-sectional variation, thereby offering a more nuanced understanding of the areas that require special audit attention and, consequently, of the allocation of audit effort. This means that KAM disclosures offer a powerful setting that allows for a more meaningful interpretation of the link between audit-firm profitability and audit effort.

We argue that more profitable audit firms are less likely to face constraints in the investment of human capital and information technology, are better able to attract and retain high quality human capital, and are more successful in supporting the audit process with state-of-the-art IT systems. Furthermore, partner-compensation policies incentivize partners to exert effort and minimize threats to

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[1] These analyses control for the determinants of audit-firm profitability identified in the previous step.

auditor independence. For that reason, partner compensation is, at least in part, a function of audit-firm profitability at the national or even international (i.e., non-local) level (Trompeter 1994; Burrows and Black 1998; Carcello, Hermanson, and Huss 2000; Elemes et al. 2021). Partners in more profitable firms are therefore more likely to uphold independence and less likely to succumb to client pressure because they will receive a larger portion of their compensation from profit sharing at the firm level. In line with these arguments, we find strong evidence that client firms of more profitable audit firms exhibit a lower level of earnings management, higher accruals quality, and a lower probability of earnings restatement. Furthermore, more profitable audit firms are more likely to issue qualified audit opinions and issue more KAMs. We find that, despite different profitability structures of Big-4 and non-Big-4 audit firms, the implications of their firm-level profitability for audit outcomes are similar. When we examine audit firms' revenues or costs separately, we do not find consistent evidence that they each affect audit quality in a systematic manner, highlighting the notion that it is the audit-firm's profitability, rather than its revenues or costs alone, that drives audit outcome.

We perform two cross-sectional tests. The first test examines the extent to which audit firm's economic dependence on the client firm influences the relation between audit firm profitability and audit outcome. On the one hand, large, influential clients create an economic dependence that may cause auditors to compromise their independence (and audit quality) to retain valuable clients. On the other hand, these clients also pose higher audit risk (Reynolds and Francis 2000; Francis and Yu 2009). Audit firms are likely to suffer a greater loss in reputation if they have audit failures for larger clients than would be the case for smaller, less visible clients. Consistent with the latter argument, we find a stronger relation between audit firm profitability and audit outcome for larger, more influential client firms.

The second cross-sectional test focuses on the client firm's financial leverage. Leverage captures the risk of a client failing, potentially exposing the auditor to loss (Simunic 1980). Simunic

and Stein (1987) argue that more highly levered firms face a higher risk of bankruptcy, which increases the auditor's liability exposure. More profitable audit firms have "deeper pockets" and more wealth at risk. Therefore, auditors from more profitable firms may have greater incentives to exert effort and maintain independence for more highly levered client firms to mitigate their liability exposure. We find some evidence that the effect of audit firm profitability on audit outcome is stronger in more highly levered client firms. However, this result seems to be sensitive to how we measure audit outcome.

Although our empirical analyses include a large number of control variables and our findings are supported by economic theory, in additional analyses we also control for both *client-firm and audit-firm fixed effects*. Doing so allows us to exploit within-client-firm and/or within-audit-firm variation over time. Specifically, audit-firm fixed effects control for across-audit-firm variations such as variations in audit-firm organizational structures, business models, audit partner compensation structure, and KAM reporting styles. Client-firm fixed effects control for variations in client-firm managerial skills and corporate culture and any other *unobservable* across-firm variations. Furthermore, we employ a changes specification and use an instrumental variables approach. Our inferences remain unchanged, enhancing our confidence to conclude that audit-firm profitability is positively associated with audit quality.

Our paper makes several contributions. First, to our knowledge, we are the first to examine the determinants of overall audit-firm profitability. Our study relates to Hoang, Jamal, and Tan (2019) who examine determinants of audit-engagement profitability. A number of studies suggest that audit-firm overall profitability plays an important role - potentially greater than audit-engagement profitability - in partner-compensation policies and in incentivizing auditors to exert effort (e.g., Trompeter (1994); Hay, Baskerville, and Qiu (2007); Ernstberger, Koch, Schreiber, and Trompeter (2020)). In addition, Hoang et al. (2019)'s proprietary dataset includes only 60 clients of one Canadian Big-4 audit firm for one year (fiscal year 2009). Our sample contains 58 audit firms in the U.K. over the 2008-2020 period. Not

only do we show that profit drivers differ between Big-4 and non-Big-4 audit firms, we are also able to consider the role of private clients in shaping audit firms' profitability. In that regard, our study complements Hoang et al. (2019) by offering additional insights into audit-firm profitability drivers. Specifically, we respond to their call for future research on exploring better measures of *firm* profitability, which is used by audit firms to make resource allocation and performance bonus decisions (Hoang et al. (2019), p.276).

Second, our study is in line with research in economics, marketing, and management that suggests that firm profitability positively affects product/service quality (Rose 1990; Dionne et al. 1997; Noronha and Singal 2004; Matsa 2011; Phillips and Sertsios 2013; Kini et al. 2017). Hoang et al. (2019) do not find a significant relation between audit quality (measured by discretionary accruals and audit adjustments) and engagement profitability. We link audit-firm and client-firm financial statement information to examine the implications of audit-firm profitability for audit effort and audit outcomes. We find an *incremental* effect of audit-firm profitability on audit outcomes, after controlling for Big-N membership and auditor industry specialization that have been extensively used in the literature to infer audit quality.

Third, we show that the positive relation between audit-firm profitability and audit outcome strengthens in economically more important client firms and more highly levered client firms. Our findings suggest that when client firms pose potentially greater audit risk, the role of firm-level profitability in shaping audit outcomes is more pronounced. In that regard, we offer insights into the interplay among audit-firm financial performance, auditor's liability exposure, and audit outcomes. Our study also adds to the stream of research that highlights the importance of exposure to litigation risk in incentivizing auditors to exert effort (Dye 1993; DeFond and Zhang 2014).

Fourth, our article contributes to the growing stream of research on the implications of KAMs/CAMs for auditors, investors, managers, and jurors (e.g., Gutierrez, Minutti-Meza, Tatum, and

Vulcheva (2018); Lennox et al. (2022); Reid, Carcello, Li, Neal, and Francis (2019); Bentley, Lambert, and Wang (2020); Gold, Heilmann, Pott, and Rematzki (2020); Tan and Yeo (2021); Drake, Goldman, Lusch, and Schmidt (2021)). Whereas this line of research explores the consequences of KAM reporting, we examine the determinants of KAM reporting and, in particular, the relation between audit-firm profitability and the level of unexpected KAMs. Finally, we hope that our findings will be relevant to regulators and standard setters in the U.S. in light of the recent PCAOB Auditing Standard 3101 (AS 3101), which requires that auditors communicate Critical Audit Matters (CAMs) to their clients, as well as to U.K. regulators.[2,3]

2. Literature Review and Hypothesis Development

2.1 Literature Review

Our study is relevant to research that examines the association between audit-firm characteristics and audit quality. Audit firms, just like other companies, invest in human capital through hiring and training employees. They use compensation policies to incentivize their employees and devise internal audit programs to maintain consistency in the implementation of accounting and auditing standards across different engagements (Francis, Pinnuck, and Watanabe 2014).

Audit-firm characteristics such as Big-N membership and industry specialization are important determinants of audit quality. Prior research suggests that Big-N auditors or auditors specialized in a specific industry deliver higher audit quality Reichelt and Wang 2010). DeFond and Zhang (2014) point out two potential limitations for this line of research. One is that the measures of Big-N

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[2] In June 2017 the PCAOB issued AS 3101, which mandates the disclosure of Critical Audit Matters as of June 30, 2019 for large accelerated filers and as of December 15, 2020 for all other companies. Lennox et al. (2022) observe that, while the standards and wording differ slightly, the intent and content of CAM disclosures are very similar to those of KAM disclosures.

[3] Recently there have been a series of high-profile accounting scandals in the U.K. KPMG U.K. has decided to stop providing non-audit serves to large publicly listed clients due to heavy regulatory pressure. We view our research findings as not only highlighting a positive relation between profitability and KAMs but also as highlighting that the Big-4 firms do not compromise audit quality when there is an increased audit risk to be informative to the U.K. regulators who are considering splitting the Big-4 firms.

membership and industry specialization fail to capture relatively subtle variations in audit quality because they are typically dichotomous. The other is that the measure of auditor industry specialization contains large measurement error.[4] Furthermore, Francis (2011) argues that research on the relation between audit firms and audit quality is severely limited by the availability of data on audit-firm characteristics and recommends that researchers should attempt to analyze audit firms' organizational structure and operations.

Our study extends this research by moving beyond client-based measures of industry expertise and auditor size and by using instead *audit-firms' financial data* to more fully analyze the economic drivers that shape audit outcomes. We examine whether audit-firm profitability, a key performance indicator, affects various dimensions of audit outcome including the supply of audit effort revealed in KAM disclosures. Therefore, our findings also shed light on audit firm-level factors that influence the number of KAMs identified and addressed by engagement partners.

2.2 Hypothesis Development

Theoretical models in economics suggest that the financial condition of a firm can affect its ability and incentives to invest in initiatives that enhance product quality (Fazzari et al. 1988; Beard 1990; Maksimovic and Titman 1991; Chevalier and Scharfstein 1996). These models have been backed by empirical evidence from many industries. For example, Rose (1990), Dionne et al. (1997), and Noronha and Singal (2004) provide evidence of a positive link between airline profitability and airline safety. Matsa (2011) finds evidence consistent with highly levered supermarkets degrading their products' quality in order to preserve current cash flow for debt service. Finally, Kini et al. (2017) utilize data on food, drug, and medical-device recalls as well as on automobile recalls to examine

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[4] Neal and Riley (2004) point out that auditor industry specialization suffers from a lack of consensus on its measurement. Specifically, prior research uses two approaches to measure industry specialization: (1) within-industry differentiation across competing audit firms, and (2) within-audit firm differentiation across industries. The choice between the two approaches has a significant impact on the research findings.

product-recall events from 37 (93) different two-digit (three-digit) SIC code industries. Their findings suggest a positive association between leverage/distress likelihood and the probability of a subsequent product recall.

Evidence from the marketing literature further suggests that firms' financial performance is important in explaining their engagement in cost-reduction activities that impair product quality and customer satisfaction (Anderson, Fornell, and Rust 1997; Malshe and Agarwal 2015). Malshe and Agarwal (2015) argue that the negative relation between financial distress and customer satisfaction is stronger in service firms because service firms are more likely to emphasize product customization. The pursuit of customer satisfaction is more likely to take place at the cost of firm productivity in firms that emphasize product customization than in firms that offer standardized products. This is because the cost of increased customization increases at an increasing rate, whereas costs decline with increased standardization quality (Anderson et al. 1997). Therefore, improving productivity in service firms is more likely to require cutting expenses that are directly linked to service quality and client satisfaction such as expenses that relate to hiring and retaining high quality specialized personnel. In line with this argument, Graham, Kim, Li, and Qiu (2013) suggest that financial distress often leads firms to pay lower wages.

Firm financial performance can affect labor supply as well. Using a proprietary dataset that tracks all jobs posted by forty high-profile financial services firms during the financial crisis, Brown and Matsa (2016) examine job-applicant behavior as a function of their perception about the posting firm's profitability. The authors find that applicants are less likely to apply to distressed firms and that this relation is more pronounced for positions with high educational requirements. They further find that applicants' average quality declines with firms' financial distress. This finding suggests a link between firm financial performance and the ability to attract high quality human capital, an important production input and determinant of service quality.

As discussed, the literature on audit-firm characteristics and their associations with audit quality begins with the Big-N dichotomy. Subsequent research identifies industry specialization as a source of variation in audit quality among audit firms (Craswell, Francis, and Taylor 1995; Beasley and Petroni 2001; Balsam, Krishnan, and Yang 2003). However, due to data constraints, much remains unknown about audit firms' organizational structure and operations and whether these firm-level factors influence the supply of audit quality.[5] Our study attempts to open up this black box as we use U.K. audit firms' financial data to understand the role of audit-firm profitability, a key performance indicator, in shaping the supply of audit quality. We posit that financial performance at the audit-firm level will have a positive impact on audit outcome, which we infer from commonly used audit quality proxies and from auditors' KAM disclosures, for two reasons.

First, more profitable firms face fewer resource constraints. They can attract and retain high-quality employees and provide them with up-to-date technical support and training. Firm-level financial performance influences investments in firm-wide audit support systems and the use of information technology to control the audit process. Anecdotal evidence is consistent with the idea that profitability concerns play an important role in investment in human capital and information technology. For example, in 2019, KPMG U.K., under profitability concerns, stepped up its cost-cutting drive by asking hundreds of its employees working in IT and legal teams to hand in their work mobile phones.[6] The audit-support system is essential for achieving high-quality audits because it is the primary technology application used by audit firms to control, facilitate, and support audit work (Manson, McCartney, and Sherer 2001; Banker, Chang, and Kao 2002; Dowling and Leech 2007). If more profitable audit firms are more competent and can afford to deploy a better audit-support system (e.g., through better staffing

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[5] Che, Hope, and Langli (2020) make use of detailed register data in Norway to examine *how* Big-4 firms provide higher audit quality than non-Big-4 firms. Such data are not available in most jurisdictions.

[6] In 2019, KPMG U.K. reported a 14 percent drop in annual profits following a series of reputational setbacks over the past two years, even though its revenue increased 3% (see more details at https://www.ft.com/content/a120f9ca-1bfe-11ea-97df-cc63de1d73f4). In its internal memo, the audit firm indicated that "*To realize our growth ambition, we need to improve our profitability by building a leaner, more responsive cost base…*" It also planned to cut about 200 of its 670 administrative support staff (see more details at
https://www.theguardian.com/business/2019/sep/30/kpmg-uk-mobiles-cut-staff).

and sharing workloads) to achieve firm-wide compliance with the audit methodology, we expect their audit teams to deliver higher audit quality including identifying and addressing more KAMs at the engagement level.

Second, audit firms design compensation policies to incentivize auditors to exert effort. They share the profits among their partners at a local (e.g., office) level or at a national/international level (Trompeter 1994; Hay et al. 2007). This is because (1) audit firms are organized as partnerships where partners are both principals and agents of the firm and thus have incentives to monitor each other (Huddart and Liang 2005) and (2) partners are required to remain independent of their clients. Research finds that profit sharing in a large profit pool at the national level is associated with higher audit quality because independence concerns arise in a small profit pool at the local level (Ernstberger et al. 2020). Knechel, Niemi, and Zerni (2013) argue that partner profit sharing is likely to depend on the partner's client base as well as attributes of the audit firm such as overall profits. For instance, on page 1 of the 2016 financial statements of PwC U.K. it is explicitly stated that partners at PwC U.K. receive a distribution of the profits of the LLP (i.e., the profits of the consolidated entity). Specifically, at PwC U.K. each partner's profit share comprises three interrelated profit-dependent components: (1) responsibility income – reflecting the partner's sustained contribution and responsibilities, (2) performance income – reflecting how a partner and their team(s) have performed, and (3) equity unit income – reflecting the *overall profitability* of the LLP. The argument that audit-partner compensation is a function of audit-firm profitability is consistent with Vandenhaute, Hardies, and Breesch (2020) and Alberti, Bedard, Bik, and Vanstraelen (2020) who suggest that audit-partner compensation structure and audit-firm culture are dominated by commercial logic.

In a more profitable audit firm, partners are less likely to compromise independence and succumb to client pressure because they will receive a larger portion of their compensation from profit sharing at the firm level. Client firms may negotiate with their auditors on reported earnings and the

number of KAMs to report. We expect that auditors facing lower profit pressure are more likely to uphold auditor independence and integrity and that their audit report more accurately reflects the effort they exert to identify and address KAMs. In contrast, poor-performing audit firms will increase their partners' vulnerability to client demands, unintentionally creating an independence threat.[7] Based on the above discussion, we state our main hypothesis in the alternative form as follows:

H1: *Audit quality is positively associated with audit-firm profitability.*

The null hypothesis is that engagement-specific audit outcome is not affected by audit-firm profitability. While we do not expect this to be the case, the research question is not without tension. Many audit firms, especially the Big-4, are highly profitable. Partners may be insensitive to minor fluctuations of firm-level profitability or they only participate in profit sharing at the local level. Furthermore, other firm-level characteristics such as firm size and engagement-level characteristics (that we control for) such as fee dependence may subsume audit-firm profitability in driving the audit process. Finally, higher profitability may create economic bonding between auditors and clients, compromising auditor independence and reducing audit quality. These tensions leave our research question as an empirical one.

3. Research Design

3.1 Determinants Analyses

We first seek to understand *what drives* audit-firm profitability. This test is exploratory in nature because we lack clear economic (audit) theory to guide our choice of the determinants of profitability at

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[7] Audit-firm size also influences auditors' independence because of higher reputation capital and litigation risk (DeFond and Zhang 2014). Our focus is on audit-firm profitability, which affects auditors' independence through compensation incentives.

the audit-firm level. However, given the importance of this topic and the lack of prior research (due to the lack of such data in the U.S.), we consider this analysis an important contribution of our study.

We classify our explanatory variables into two groups: *audit-firm* characteristics and *clientele* characteristics. Audit-firm characteristics include size, intangible asset intensity, cash holdings, and industry specialization. Larger firms benefit from economies of scale and market power, so we expect them to be more profitable (Hall and Weiss 1967; Schmalensee 1989). We measure audit-firm size by the natural logarithm of the number of employees (*LnEmpl AF*) and Big-4 membership (*Big4*). Firms compete in product markets by investing in innovation using their cash holdings (Lyandres and Palazzo 2016). Given audit firms' strong commitment to emerging technologies, we expect their cash policies to be strategically motivated by investments in innovation, which in turn can influence firm growth and operating performance. Accordingly, we include cash holdings (*LnCash AF*) as a potential contributing factor to profitability. We define this variable as the natural logarithm of audit-firm cash holdings. Prior research provides evidence consistent with intangible asset intensity being a determinant of tax-motivated profit shifting in audit-firm networks (and hence, audit-firm profitability) (Elemes et al. 2021). Accordingly, we include a control for the ratio of audit-firm intangible to total assets. Finally, industry specialists charge a fee premium (Hay, Knechel, and Wong 2006) and could be associated with higher profitability. We therefore control for auditor industry specialization, averaged at the audit-firm-year level (*AvgIndSpec AF*). We define auditor industry specialization (*IndSpec AF*) as the ratio of all audit fees collected by a given audit firm in a given industry-year to the sum of all audit fees collected by all audit firms in that industry-year. We identify industries using their two-digit SIC code.

We also expect certain client-firm characteristics to be associated with audit-firm profitability. The literature provides compelling evidence that auditors charge higher fees for riskier clients and larger clients whose operations are more complex (Hay et al. 2006). However, whether these clients improve or hurt audit-firm profitability is an open question, as it is not clear whether audit firms can

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fulfill their service in a cost-effective way. Our unit of observation is *audit firm-year*. Our client-firm determinants are therefore estimated at the audit firm-year level and represent mean values of the respective determinant.[8] We include the proportion of public client firms to the total number of client firms (*AvgPublic CF*), the proportion of client firms reporting a loss (negative net income) to the total number of client firms (*AvgLoss CF*), the average client size (*AvgLnAssets CF*), the average client leverage (*AvgLeverage CF*), the average client operating performance (*AvgROA CF*), the average proportion of client receivables and inventory to total assets (*AvgRecInv CF*), the average client sales volatility (*AvgStdSales CF*), the average client non-audit to audit fees ratio (*AvgNonAuditFeesRatio CF*), the average client importance (*AvgInfluential CF*), and the average client number of subsidiaries (*AvgLnNumSubs CF*). For these variables, we do not make directional predictions.

We estimate the following equation using OLS:

$$EBIT\ Margin\ AF_{j,t} = \alpha_0 + \alpha_1 LnEmpl\ AF_{j,t} + \alpha_2 LnCash\ AF_{j,t} + \alpha_3 Intangibles\ AF_{j,t} +$$
$$\alpha_4 AvgIndSpec\ AF_{j,t} + \alpha_5 Big4_{j,t} + \alpha_6 AvgPublic\ CF_{i,t} + \alpha_7 AvgLnAssets\ CF_{i,t} + \alpha_8 AvgLeverage\ CF_{i,t}$$
$$+ \alpha_9 AvgROA\ CF_{i,t} + \alpha_{10} AvgLoss\ CF_{i,t} + \alpha_{11} AvgRecInv\ CF_{i,t} + \alpha_{12} AvgStdSales\ CF_{i,t} +$$
$$\alpha_{13} AvgNonAuditFeesRatio\ CF_{i,t} + \alpha_{14} AvgInfluential\ CF_{i,t} + \alpha_{15} AvgLnNumSubs\ CF_{i,t} + Year$$
$$Fixed\ Effects + \varepsilon_{i,t}\ (1)$$

where *EBIT Margin AF$_{j,t}$* is earnings before interest and taxes scaled by sales for audit firm *j* in year *t*.

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[8] Because our analysis is at the audit firm-year level, we use the mean values of client firm variables in each year to capture the clientele effect on audit-firm profitability. Prior research adopts the same approach to controlling for the clientele effect in audit firm-level analyses. For example, to examine the deep pockets hypothesis, Lennox (1999) estimates the relation between the amount of litigation incurred by auditors and auditor size, controlling for the average client size.

3.2 Consequences Analyses

To test our hypothesis, we estimate the following baseline equation using OLS or logit estimation techniques (depending on the outcome measure):

$$\textit{Audit Quality}_{i,j,t} = \alpha_0 + \alpha_1 \textit{EBIT Margin AF}_{j,t} + \alpha_2 \textit{LnEmpl AF}_{j,t} + \alpha_3 \textit{LnCash AF}_{j,t} + \alpha_4 \textit{Intangibles}$$

$$\textit{AF}_{j,t} + \alpha_5 \textit{IndSpec AF}_{j,t} + \alpha_6 \textit{Big4}_{j,t} + \alpha_7 \textit{Public CF}_{i,t} + \alpha_8 \textit{LnAssets CF}_{i,t} + \alpha_9 \textit{Leverage CF}_{i,t} +$$

$$\alpha_{10} \textit{ROA} \quad \textit{CF}_{i,t} \quad + \quad \alpha_{11} \textit{Loss} \quad \textit{CF}_{i,t} \quad + \quad \alpha_{12} \textit{RecInv} \quad \textit{CF}_{i,t} \quad + \quad \alpha_{13} \textit{StdSales} \quad \textit{CF}_{i,t} \quad +$$

$$\alpha_{14} \textit{NonAuditFeesRatio} \quad \textit{CF}_{i,t} \quad + \quad \alpha_{15} \textit{Influential} \quad \textit{CF}_{i,t} \quad + \quad \alpha_{16} \textit{LnNumSubs} \quad \textit{CF}_{i,t} \quad +$$

$$\alpha_{17} \textit{AuditorSwtich CF}_{i,t} + \textit{Year Fixed Effects} + \textit{Industry Fixed Effects} + \varepsilon_{i,t} \ (2)$$

We use the following outcome measures: the level of absolute discretionary accruals (*|DACC| CF*) as in Kothari et al. (2005), the McNichols (2002) modification of the Dechow and Dichev (2002) accrual quality measure (*AQ CF*), the propensity to issue a qualified opinion (*Qualified CF*), the likelihood of earnings restatements (*Restatement CF*), and the level of unexpected KAMs (*Unexp. KAMs CF*).

3.2.1 Absolute Value of Performance-Adjusted Discretionary Accruals (*|DACC| CF*)

We estimate performance-adjusted discretionary accruals following Kothari et al. (2005). Specifically, we perform annual cross-sectional regressions of the following equation for each two-digit SIC industry and fiscal year, with at least 20 observations per regression (Hope, Thomas, and Vyas 2013):

$$\textit{TACC CF}_{i,t} = \alpha_0 + \alpha_1 \, (1/\textit{Assets CF}_{i,t-1}) + \alpha_2 \Delta \textit{Sales CF}_{i,t} + \alpha_3 \textit{Tangibles CF}_{i,t} + \alpha_4 \textit{ROA CF}_{i,t} + \varepsilon_{i,t} \ (3)^9$$

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[9] *TACC*$_{i,t}$: client-firm total accruals scaled by total assets. We calculate total accruals as change in current assets less change in current liabilities less change in cash plus change in short-term debt less depreciation; *ΔSales CF*$_{i,t}$: the change in client-firm sales scaled by total assets; *Tangibles CF*$_{i,t}$: the ratio of client-firm tangible to total assets; *ROA*$_{i,t}$: the ratio of client-firm net income to client-firm total assets.

|DACC| CF is the absolute value of the client-firm-specific residuals estimated from equation (3). Higher values of *|DACC| CF* indicate more earnings management and lower audit quality. To the extent that more profitable audit firms deliver higher audit quality, we expect a negative coefficient on *EBIT Margin AF* when we measure audit quality using *|DACC| CF*.

3.2.2 Mapping Between Working Capital Accruals and Cash Flows from Operations (*AQ CF*)

We measure the extent to which working capital accruals map into past, present, and future cash flows from operations using the McNichols (2002) modification of the Dechow and Dichev (2002) model. Specifically, we estimate the following equation for each two-digit SIC industry and fiscal year with at least 20 observations per regression:

$$WCACC\ CF_{i,t} = \alpha_0 + \alpha_1 CFO\ CF_{i,t-1} + \alpha_2 CFO\ CF_{i,t} + \alpha_3 CFO\ CF_{i,t+1} + \alpha_4 \Delta Sales\ CF_{i,t} + \alpha_5 Tangibles\ CF_{i,t} + \varepsilon_{i,t}\ (4)^{10}$$

Following Francis, LaFond, Olsson, and Schipper (2005), we calculate *AQ CF* as the five-year standard deviation (from year *t*-4 to year *t*) of the estimated firm-year residuals from equation (4). Higher values of *AQ CF* indicate more accrual estimation errors and lower audit quality. To the extent that more profitable audit firms deliver higher audit quality, we expect a negative coefficient on *EBIT Margin AF* when we measure audit quality using *AQ CF*.

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[10] *WACC CF_{i,t}*: client-firm working capital accruals scaled by total assets. We calculate working capital accruals as change in current assets less change in current liabilities less change in cash plus change in short-term debt; *CFO_{i,t}*: client-firm cash flow from operations of firm *i* in year *t*, calculated as net income before extra-ordinary items less total accruals.

3.2.3 The Propensity to Issue a Qualified Auditor Opinion (*Qualified CF*)

Our third audit quality proxy is the propensity to issue a qualified auditor opinion (*Qualified CF*). We define this variable as an indicator taking the value 1 if a client-firm receives a qualified audit opinion, and 0 otherwise. In line with prior research (e.g., Francis and Yu (2009)) we limit our analyses of the relation between audit-firm profitability and the propensity to issue a qualified auditor opinion to distressed client-firms (i.e., client-firms with negative net profit) because the auditor's decision to issue a qualified audit opinion is likely more salient for financially distressed clients. We expect a positive coefficient on *EBIT Margin AF* to the extent that more profitable firms are more likely to issue a qualified audit opinion to financially distressed client firms.

3.2.4 Earnings Restatements (*Restatement CF*)

Our fourth audit quality proxy is earnings restatements (*Restatement CF*). We define this variable as an indicator taking the value 1 if a client-firm subsequently restates its financial statements in a given year (in either direction), and 0 otherwise. A negative coefficient on *EBIT Margin AF* is in line with more profitable audit firms limiting egregious forms of earnings management.

3.2.5 The Level of Unexpected KAMs (*Unexp. KAMs CF*)

For our fifth audit quality proxy we rely on the KAM prediction model of Lennox et al. (2022). Specifically, we estimate the following equation:

$LnNumKAMs\ CF_{i,t} = \alpha_0 + \alpha_1 LnAssets\ CF_{i,t} + \alpha_2 Loss\ CF_{i,t} + \alpha_3 RecInv\ CF_{i,t} + \alpha_4 LnNumSubs\ CF_{i,t} +$

$\alpha_5 Problem\ CF_{i,t} + \alpha_6 LagQualified\ CF_{i,t} + \alpha_7 Intangibles\ CF_{i,t} + \alpha_8 Tangibles\ CF_{i,t} + \alpha_9 LagAcquisition\ CF_{i,t} +$

α_{10}*Extr. Items CF*$_{i,t}$ + α_{11}*Sales Growth CF*$_{i,t}$ + α_{12}*Deferred Taxes CF*$_{i,t}$ + *Year Fixed Effects* + *Industry Fixed Effects* + $\varepsilon_{i,t}$ (5)[11]

Our final proxy for audit effort and audit quality is the level of unexpected KAMs (*Unexp. KAMs CF*) estimated from the residuals of equation (5). A positive coefficient on *EBIT Margin AF* is consistent with the idea that auditors from more profitable audit firms exert more effort to identify and communicate KAMs.

Control Variables

The control variables can be broadly classified into two groups. The first group contains the audit-firm characteristics identified in our preceding determinants analyses. In particular, we include *LnEmpl AF, LnCash AF, Intangibles AF, IndSpec AF,* and *Big4*.[12]

Our second group of control variables contains client-firm determinants of audit quality. Following prior research (Burgstahler, Hail, and Leuz 2006; Francis and Yu 2009; Hope et al. 2013; Lennox et al. 2022), we include client-firm size/complexity measured by the natural logarithm of total assets (*LnAssets CF*)*,* listing status (*Public CF*), and the natural logarithm of the number of subsidiaries (*LnNumSubs CF*). We include controls for performance using return on assets (*ROA CF*) and loss making (*Loss CF*). We include the ratio of receivables and inventory to total assets (*RecInv CF*) to capture components that require certain audit procedures and are often viewed as sources of increased

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[11] *LnAssets CF*$_{i,t}$: the natural logarithm of client-firm total assets; *Loss CF*$_{i,t}$: an indicator variable taking the value 1 if a client-firm reports negative net income, and 0 otherwise; *RecInv CF*$_{i,t}$: the ration of client-firm receivables and inventory to client-firm total assets; *LnNumSubs CF*$_{i,t}$: the natural logarithm of client firm number of subsidiaries; *Problem CF*$_{i,t}$: an indicator variable that takes the value 1 if a client firm restated its earnings in the previous two years, and 0 otherwise; *LagQualified CF*$_{i,t}$: variable *Qualified CF*$_{i,t}$, lagged by one year; *Intangibles CF*$_{i,t}$: the ratio of client-firm intangible to total assets; *Tangibles CF*$_{i,t}$: the ratio of client-firm tangible to total assets; *LagAcquisition CF*$_{i,t}$: the ratio of client-firm acquisitions amount to client-firm total assets*,* lagged by one year; *Extr. Items CF*$_{i,t}$: the ratio of client-firm extra-ordinary items to client-firm total assets; *Sales Growth CF*$_{i,t}$: the percentage change in client-firm sales; *Deferred Taxes CF*$_{i,t}$: the ratio of client-firm deferred taxes to client-firm total assets.

[12] Prior research suggests that industry specialists are associated with more favorable audit outcomes and superior audit quality (Balsam et al. 2003; Krishnan 2003; Reichelt and Wang 2010). Therefore, auditor industry specialization is a potential determinant of audit-firm profitability and audit quality.

audit risk. Further, we include the level of operating volatility (*StdSales CF*) and leverage (*Leverage CF*) to represent riskiness.

To assess the potential economic bonding between the client firm and its auditor we control for the ratio of non-audit to audit fees (*NonAuditFeesRatio CF*), whether the client changes its auditor in year *t* (*AuditorSwitch CF*), as well as a proxy for client importance (*Influential CF*). We define this variable as the ratio of total fees collected by a given client to the sum of total fees collected by all clients in a given year. Following prior research (Ashbaugh, LaFond, and Mayhew 2003; Choi, Kim, Kim, and Zang 2010), we augment equation (2) by including the level of lagged total accruals (*LagTACC CF*) in the specifications in which we measure audit quality using proxies for financial reporting quality (*|DACC| CF* and *AQ CF*) to control for the reversal of accruals over time. Finally, we include industry and year fixed effects. We define industries using their two-digit SIC code. In all models we use heteroskedasticity-robust standard errors, clustered at the audit-firm level.

4. Sample Selection and Descriptive Statistics

4.1 Sample Selection

Our main source of U.K. data is the FAME database by Bureau van Dijk. Our initial sample consists of all U.K. private and publicly listed firms in the FAME database with available auditor financial statement information during the period 2008-2020 (689,329 client-firm-year observations).[13] We drop firms belonging in the financial sector (SIC codes: 60-69) as well as private firms that are not subject to mandatory audit[14] (159,881 and 237,467 client-firm-year observations, respectively). We further delete observations without enough data to calculate our accrual-based outcome measures

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[13] Audit firms are private (i.e., not publicly listed). Therefore, they are required to comply with the Fourth EU Directive and its amendments that mandate the financial statement disclosure and audit of all private firms that meet certain size criteria. To identify audit firms in FAME we limit our sample to those private firms that engage in accounting, bookkeeping, auditing, and tax consultancy activities (Peer group code: 6920). We subsequently manually match the company name field (i.e., the audit-firm name field) in the audit-firm sample with the auditor name field in the client-firm sample.

[14] https://www.gov.uk/audit-exemptions-for-private-limited-companies

(*|DACC| CF* and *AQ CF*) and observations with missing values for the control variables in equation (2) (187,127 client-firm-year observations). Our main sample consists of 104,854 client-firm-year and 502 audit-firm-year observations (58 unique audit firms). We present the sample selection procedures for the main sample in Table 1, panel A.

For our analyses that examine the relation between audit-firm profitability and the auditor's propensity to issue a qualified auditor opinion we drop client-firms with positive net income (82,322 client-firm-year observations). We additionally lose 3,154 client-firm-year observations upon including industry fixed effects in the logit specifications. Our qualified opinion sample consists of 19,378 client-firm-year observations. Table 1, panel B presents the sample selection procedures for the qualified opinion sample.

We use Audit Analytics Europe as our source for restatement data. Restatement data is only available for private firms. We therefore drop 99,021 private client-firm-year observations from our main sample. Restatement announcement coverage in Audit Analytics Europe starts in 2017. Prior research documents a considerable time lag between the original financial statement release and a subsequent restatement (Cheffers, Whalen, and Usvyatsky 2011). Accordingly, we use 2014 as our cutoff year (i.e., drop firm-years before 2014; 2,424 client-firm-year observations) to allow sufficient time for the subsequent restatements to occur. Finally, we lose 1,144 client-firm-year observations when including industry fixed effects in the logit specifications. Our restatement sample consists of 2,265 client-firm-year observations. Table 1, panel C presents the sample selection procedures for the restatement sample.

We use Audit Analytics Europe as our source for the KAM data as well (only available for publicly listed firms). In June 2013, the U.K. issued ISA 700 (Revised) that requires auditors to report KAMs. This requirement became mandatory for firms with a premium listing of stocks on the London Stock Exchange Main Market for fiscal year-ends in or after September 2013 and for all firms for fiscal

year-ends in or after December 2016. Accordingly, our sample includes U.K. premium-listed firms with fiscal year ends between September 2013 and November 2016 and all U.K. listed firms with fiscal year-ends between December 2016 and December 2020. Our KAM sample consists of 2,722 client-firm-year observations (we drop 99,021 private client-firm-year observations from the main sample, 2,128 client-firm-year observations representing client-firm-years before September 2013 and 983 client-firm-year observations representing non-premium listed firms with fiscal year-ends between September 2013 and November 2016). Table 1, panel D presents the sample selection procedures for the KAM sample.

4.2 Descriptive Statistics

Panel A (panel B) of Table 2 presents descriptive statistics for the variables used in the determinants (consequences) analyses. On average, audit firms report an *EBIT Margin AF* of 24%. The mean of *Big4* in panel A suggests that 10% of our audit-firm data relate to Big-4 accounting firms. Big-4 accounting firms audit roughly 66% of the main sample client firms as indicated by the mean of *Big4* in panel B. Roughly 1% of the firms in the qualified opinion sample have received a qualified opinion as suggested by the mean of *Qualified CF*. Furthermore, 14% of the client-firm observations in the restatement sample relate to client-firm-years that are subsequently restated. Finally, 6% of our sample firms change auditors over the sample period, as indicated by the mean of *AuditorSwitch CF*.

Panel C of Table 2 reports the correlations between client-firm outcome measures and audit-firm variables. We find that *EBIT Margin AF* is significantly negatively (positively) correlated with *|DACC| CF*, *AQ CF*, and *Restatement CF* (*Unexp. KAMs CF*). Furthermore we find a positive and insignificant correlation coefficient between *EBIT Margin AF* and *Qualified CF*. The bivariate results therefore provide initial support for our hypothesis. In terms of the audit quality proxies, *|DACC| CF* and *AQ CF* are significantly positively correlated. *Qualified CF* is significantly positively correlated

with *AQ CF* and *Restatement CF*. Finally, *Unexp. KAMs CF* is significantly negatively correlated with *Restatement CF*. In Panel D we present the correlations between outcome measures and client-firm characteristics.

Panel E of Table 2 presents the results of the KAM prediction model of equation (5). In line with expectations, we find that auditors detect and disclose more KAMs for large clients, loss-making clients, clients with more subsidiaries, and clients that have restated their earnings or have received a qualified auditor opinion in the past. Finally, firms with more extra-ordinary items are more likely to receive a KAM.

5. Results

5.1 Determinants of Audit-Firm Profitability

We present the audit-firm profitability determinants analyses in Table 3, panel A (models 1-3). In the first model of panel A, we report the results for all 502 audit-firm-year observations between 2008 and 2020. We find that audit-firm cash holdings are positively and significantly associated with profitability. Big-4 firms are significantly more profitable than non-Big-4 firms. Turning to clientele characteristics, we document evidence that auditing more complex client firms is less profitable for audit firms. We also find that client-firm loss-making and client-firm leverage are negatively associated with audit-firm profitability. Furthermore, audit firms with more influential clients and audit firms with higher non-audit-to-audit fees ratios are associated with lower audit-firm profitability. These are new findings in the literature.

Big-4 and non-Big-4 audit firms operate in different segments of the U.K. audit market and their business models (profit functions) are likely to differ. For instance, Chaney, Jeter, and Shivakumar (2004) suggest that, relative to non-Big-4 firms, Big-4 firms are able to carry out audits more efficiently for large and complex client firms. Thus, we separately estimate the audit-firm profitability equation for

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the Big-4 and non-Big-4 subsamples in the next two models of panel A. We find that Big-4 profitability increases with the number of public client firms (*AvgPublic CF*) and the size of client firms (*AvgLnAssets CF*) but drops with client-firm operating volatility (*AvgStdSales CF).*

In contrast, non-Big-4 profitability is positively associated with audit-firm cash holdings (*LnCash AF*), suggesting that the profitability of small audit firms is sensitive to cash policies. Client-firm size (*AvgLnAssets CF*) and listing status (*AvgPublic CF*) are negatively associated with audit-firm profitability, consistent with non-Big-4 profitability being optimized for smaller, private client firms. Furthermore, client-firm loss-making is negatively associated with audit-firm profitability for non-Big-4 auditors. Finally, non-Big-4 audit firms with more influential clients as well as non-Big-4 audit firms with higher non-audit-to-audit fees ratios are associated with lower profit margins.

To shed light into the determinants of *components* of audit-firm profitability for Big 4 and non-Big 4 accounting firms, we repeat our estimations of models 2 and 3 after decomposing *EBIT Margin AF* into a revenue component (*Revenues AF*) and three alternative cost components, i.e., total operating audit-firm costs (*Costs AF*), audit-firm staff costs (*StaffCosts AF*), and audit-firm all other costs (*OtherCosts AF*). We present these analyses in models 1-4 of panels B (Big 4 auditors) and C (non-Big 4 auditors). Panel B (panel C) of Table 3 shows that the positive (negative) association between proxies for client-firm complexity and audit-firm profitability in Big 4 (non-Big 4) audit-firms is generally driven, in part, by a positive (negative) association between client-firm complexity and audit-firm revenues and, in part, by a negative (positive) association between client-firm complexity and audit-firm non-staff costs (i.e., overhead and other costs).

Overall, the results reported in Table 3 reveal that, while both audit-firm characteristics and clientele characteristics are associated with profitability at the audit-firm level, Big-4 and non-Big-4 auditors target different audit-market segments and have different sources of profitability. Our analyses provide new empirical evidence that has previously not been possible due to lack of data on audit firms.

In addition, these audit-firm and clientele characteristics may also influence the demand for and supply of audit quality, highlighting the importance of controlling them in our analysis of the relation between audit-firm profitability and audit outcomes.

5.2 Audit-Firm Profitability and Audit Outcomes

Our hypothesis predicts a positive relation between audit-firm profitability and audit quality. We report the results of testing H1 in Table 4 (models 1-5). Regardless of how we measure audit quality we find evidence in line with more profitable audit firms exerting more effort and delivering higher audit quality. In particular, in model 1 we examine the relation between audit-firm profitability and client-firm absolute discretionary accruals (*|DACC| CF*). We find that the coefficient on *EBIT Margin AF* is significantly negative (α_1 = -0.005; *t*-stat = -3.22). This finding is consistent with client firms of more profitable audit firms engaging in lower levels of earnings management. In model 2 we use *AQ CF* as our proxy for audit quality. We find a significantly negative coefficient on *EBIT Margin AF* (α_1 = -0.003; *t*-stat = -2.00) suggesting that client firms of more profitable audit firms have lower accrual estimation errors. Model 3 examines the association between audit-firm profitability and the propensity to issue a qualified auditor opinion (*Qualified CF*) for loss client firms. Once again, results are consistent with expectations as indicated by the significantly positive coefficient on *EBIT Margin AF* (α_1 = 4.566; *z*-stat = 1.73).[15] In model 4 we measure audit quality using earnings restatements (*Restatement CF*). We find a significantly negative coefficient on *EBIT Margin AF* suggesting that client firms of more profitable audit firms are less likely to restate their earnings (α_1 = -4.099, *z*-stat = -2.57).[16,17] Finally, our estimations of model 5 reveal that more profitable audit firms are associated with higher levels of unexpected KAMs (*Unexp. KAMs CF*) as indicated by the significantly positive

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[15] Inferences are unchanged if we repeat our estimations of model 3 using OLS (instead of logit) techniques.

[16] In untabulated analyses we re-estimate model 4 separately for income-increasing and income-decreasing restatements. We continue to find a significantly negative coefficient on audit-firm profitability regardless of the direction of the restatement.

[17] Inferences are unchanged if we repeat our estimations of model 4 using OLS (instead of logit) techniques.

coefficient on *EBIT Margin AF* (α_1 = 0.826; *t*-stat = 2.52). Taken together, the results of Table 4 provide consistent evidence in line with more profitable audit firms exerting more effort and delivering higher audit quality.[18]

Turing to the control variables, we find that Big-4 clients (*Big4*) are associated with lower financial reporting quality (regardless of how we measure it i.e., *|DACC| CF* or *AQ CF*). This finding is consistent with Chen, Elemes, and Lobo (2021) who suggest that Big-4 accounting firms emphasize tax planning rather than financial reporting quality in the audit services they deliver to private-firm clients (94% of the firms in the main sample are private firms). In addition, Big-4 clients are less likely to receive a qualified auditor opinion and are less likely to restate their earnings. In line with prior research (Burgstahler et al. 2006; Hope et al. 2013), we find that large client firms (*LnAssets CF*) and publicly listed client firms (*Public CF*) are generally associated with better financial reporting quality. Furthermore, loss-making client firms (*Loss CF*) have lower financial reporting quality and higher levels of unexpected KAMs. After controlling for loss-making we find that client-firm profitability (*ROA CF*) is negatively associated with financial reporting quality, consistent with very profitable client firms engaging in earnings management. Furthermore, more profitable client firms are less likely to receive a qualified auditor opinion and are associated with higher levels of unexpected KAMs. Finally, we find that more important, influential clients (*Influential CF*) are more likely to receive a qualified auditor opinion and are associated with more unexpected KAMs in line with auditors having stronger reputation and/or litigation considerations for these clients (Francis and Yu 2009).

Because our determinants analyses of Table 3 reveal significant differences in the profitability structures of Big-4 and non-Big-4 accounting firms, in untabulated analyses we repeat our estimations

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[18] In untabulated analyses we decompose audit-firm profitability into revenue (*Revenues AF*) and cost (*Costs AF*) component and examine, in separate specifications, the relation between each profitability component and audit quality. We fail to find a significant association between audit-firm revenues or audit-firm costs and audit outcomes in all but one outcome specifications (the coefficient on *Revenues AF* (*Costs AF*) is significantly positive (positive) in the specification where we measure audit quality using *Unexp. KAMs CF*). The absence of consistent evidence of a link between components of audit-firm profitability and audit outcome supports the notion that it is the audit-firm's profitability, rather than its revenues or costs alone, that drives audit outcome.

of equation (2) separately for Big-4 and non-Big-4 auditors. We find that the coefficient on *EBIT Margin AF* is significantly negative in models 1 (*|DACC| CF*) and 4 (*Restatement CF*) when we limit our sample to Big-4 accounting firms. Furthermore, the coefficient on *EBIT Margin AF* is significantly negative in models 1 (*|DACC| CF*), 2 (*AQ CF*), and 4 (*Restatement CF*) when we limit the sample to non-Big 4 auditors. We conclude that, despite different profitability structures of Big-4 and non-Big-4 audit firms, the implications of their firm-level profitability for audit outcomes are similar.

5.3 Cross-Sectional Analyses

Our findings are consistent with more profitable auditors having stronger litigation considerations and being less likely to succumb to client-firm pressure (i.e., being more likely to uphold independence). In supplemental analyses we perform two cross-sectional analyses to examine how exposure to client-firm risk and/or client-firm pressure moderates the relation between audit-firm profitability and audit outcomes.

5.3.1 The Association Between Audit-Firm Profitability and Audit Outcomes Conditional on Client-Firm Importance

Our first cross-sectional analyses examine whether audit-firm financial condition matters when auditing larger, influential clients. On the one hand, auditor-client economic dependence is greater for influential clients. Therefore, influential clients are likely to have increased bargaining power and the ability to exercise pressure over their auditors to report favorably. [19] On the one hand, due to their size and greater relative importance these clients pose higher audit risk (Reynolds and Francis 2000; Francis and Yu 2009). To the extent that more (less) profitable audit firms have stronger (weaker) litigation

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[19] Our determinants analyses (Table 3) suggest that audit firms with more influential clients are associated with lower profit margins. This finding is consistent with prior research suggesting that buyer bargaining power is associated with lower supplier profit margins (Lustgarten 1975; LaFrance 1979; Galbraith and Stiles 1983; Ravenscraft 1983). Even if audit-firm profitability is lower for influential clients, larger, influential clients are likely to have strong bargaining power over their auditors due to these clients significantly contributing to the overall profit (in absolute terms) of the audit firm.

considerations due to their "deeper pockets" and are less (more) likely to succumb to client-firm pressure, we expect the positive relation between audit-firm profitability and audit quality to be stronger for influential clients.

To investigate this, we estimate an expanded version of equation (2) by allowing the relation between audit-firm profitability and audit outcome to vary with the level of client-firm importance (*Influential CF*). Specifically, we estimate the following equation:

$$Audit\ Quality_{i,j,t} = \alpha_0 + \alpha_1 EBIT\ Margin\ AF_{j,t} + \alpha_2 EBIT\ Margin\ AF_{j,t} \times Influential\ CF_{i,t} + \alpha_3$$

Influential CF$_{i,t}$ + *Controls* + *Year Fixed Effects* + *Industry Fixed Effects* + $\varepsilon_{i,t}$ (6)

We present the results of estimating equation (6) in Table 5, panel A. Consistent with expectations, we find a significantly negative (positive) coefficient on *EBIT Margin AF × Influential CF* when we measure audit quality using *|DACC| CF* and *AQ CF* (*Unexp. KAMs CF*). The coefficient on *EBIT Margin AF × Influential CF* is negative (positive) and insignificant when we measure audit quality using *Restatement CF* (*Qualified CF*). Taken together, the results of Table 5, panel A are consistent with more profitable audit firms delivering higher audit quality to influential clients than less profitable audit firms.

5.3.2 The Association Between Audit-Firm Profitability and Audit Outcomes Conditional on Client-Firm Leverage

A key factor that drives auditors to supply audit effort (quality) is their litigation concern (Dye 1993).[20] Hay et al. (2006) suggest that auditor exposure to litigation risk increases with client-firm

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[20] Audit litigation can be serious enough to threaten the viability of even the largest and most profitable audit firms. Research finds compelling evidence that audit firms consider litigation risk in the planning stages of the audit and in the pricing of audit services (e.g., Simunic (1980); Brumfield, Elliott, and Jacobson (1983); Ewert, Feess, and Nell (2000);

leverage because leverage measures the risk of a client failing. Therefore, in our second cross-sectional analysis we examine the moderating role of client-firm leverage on the relation between audit-firm profitability and audit outcome. Specifically, we estimate an expanded version of equation (2) by allowing the relation between audit-firm profitability and audit outcome to vary with the level of client-firm leverage (*Leverage CF*):

Audit Quality$_{i,j,t}$ = α_0 + α_1*EBIT Margin AF*$_{j,t}$ + α_2*EBIT Margin AF*$_{j,t}$ × *Leverage CF*$_{i,t}$ + α_3 *Leverage CF*$_{i,t}$ + *Controls* + *Year Fixed Effects* + *Industry Fixed Effects* + $\varepsilon_{i,t}$ (7)

We present the results of estimating equation (7) in Table 5, panel B. We find some evidence consistent with more profitable audit firms exerting more effort and taking action to protect themselves from exposure to potential litigation risk from levered client firms. Specifically, we find that the coefficient on *EBIT Margin AF* × *Leverage CF* is significantly positive when we measure audit quality using *Qualified CF* (model 3) and *Unexp. KAMs CF* (model 5). The coefficient on *EBIT Margin AF* × *Leverage CF* is indistinguishable from zero when we measure audit quality using *|DACC| CF*, *AQ CF* or *Restatement CF*. Overall, the results of Table 5, panel B support the notion more profitable audit firms have stronger incentives to deliver high audit quality for more levered clients.

5.4 Further Controls for Endogeneity

5.4.1. Controlling for *Client-Firm* and *Audit-Firm* Fixed Effects

Our results support the notion that more profitable audit firms exert more effort and/or are less likely to compromise their independence. However, it is possible that our findings reported in Table 4 are subject to an omitted variable bias. *Unobservable, time-invariant* client- or audit-firm

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Simunic and Stein (1996); Peecher, Solomon, and Trotman (2013); Gietzmann and Pettinicchio (2014); Bigus (2015); Bronson, Ghosh, and Hogan (2017); Elemes and Chen (2020)).

characteristics that are determinants of audit-firm profitability may also influence audit quality. For instance, reliance on incentive-based compensation may differ across audit firms (Bouwens, Bik, and Zou 2019). Each audit firm has its own audit (reporting) style (Francis et al. 2014). Client-firm management quality and corporate culture are likely to influence audit risk and are also potential drivers for audit-firm performance.

Consequently, we re-estimate equation (2) after controlling for *audit-firm* and *client-firm* fixed effects. We present the results of these analyses in Table 6, panel A.[21] We continue to find a significantly positive association between audit-firm profitability and audit quality (regardless of how we measure it). Importantly, our results are stronger in four out of the five models (models 2, 3, 4, and 5) when we control for audit-firm and client-firm fixed effects than when we do not (Table 4), suggesting that within-audit-firm variation has an economically meaningful impact on audit outcome.

5.4.2 Changes Specifications

Next, we employ strict changes specifications. These specifications difference out unmeasured and unchanging causes of audit outcomes that may be associated with audit-firm profitability. Specifically, we regress changes in each outcome measure on changes in audit-firm profitability (*ΔEBIT Margin AF*), after controlling for changes in all control variables of equation (2). We tabulate the findings in Table 6, panel B. Consistent with H1, we continue to find a significantly negative (positive) coefficient on *ΔEBIT Margin AF* when we measure audit quality using *|DACC| CF* and *AQ CF* (*Qualified CF* and *Unexp. KAMs CF*). The coefficient on *ΔEBIT Margin AF* is negative and insignificant when we measure audit quality using *Restatement CF*.

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[21] Variable *LnNumSubs CF* is time-invariant and therefore drops out in these analyses.

5.4.3 Instrumented Audit-Firm Profitability and Audit Outcomes

Our findings are consistent with economic theory suggesting that firm profitability positively affects product/service quality (Fazzari et al. 1988; Beard 1990; Maksimovic and Titman 1991; Chevalier and Scharfstein 1996). Nevertheless, to further control for possible residual endogeneity related to "unobservables" and/or the direction of causality, we use the ratio of audit-firm tax expense to audit-firm total assets as our instrument for audit-firm profitability. We expect this instrument to be strongly positively associated with audit-firm profitability. However, there is no reason to expect that the ratio of audit-firm tax expense to audit-firm total assets should have an effect on audit outcomes for the focal client.

In the first-stage model we regress *EBIT Margin AF* on the ratio of audit-firm tax expense to audit-firm total assets as well as the control variables in equation (2). We use the predicted value from the first-stage regression model to calculate the instrumented (predicted) audit-firm profitability. We next rerun equation (2) after replacing *EBIT Margin AF* with the predicted value from the first-stage regression. We present these analyses in Table 6, panel C. Our references remain unchanged. In particular, we continue to find a significantly negative coefficient on *EBIT Margin AF* in models 1 (*|DACC| CF*), 2 (*AQ CF*), and 4 (*Restatement CF*) and a significantly positive coefficient on *EBIT Margin AF* in models 3 (*Qualified CF*) and 5 (*Unexp. KAMs CF*).

We perform several tests to examine the validity of our instrument following the approach described by Larcker and Rusticus (2010). In the first-stage regression of audit-firm profitability on our instrument and all controls in equation (2), the partial F-statistic of the instrument ranges between 724.15 and 3,701.51 (depending on the specification). These values are well above the thresholds recommended by Stock, Wright, and Yogo (2002). We further report a *p*-value of less than 0.05 for both the Anderson-Rubin Wald test and the Stock-Wright LM S statistic (OLS regressions) in all

specifications.[22] The null hypothesis tested in both cases is that the coefficients of the endogenous regressors in the structural equation are jointly equal to zero, and, in addition, that the over-identifying restrictions are valid. Finally, using the Hansen J test for over-identifying restrictions (OLS regressions), we fail to reject the null hypothesis that the instrument is exogenous (the *p*-value is 1.00 in all specifications). These tests enhance our confidence about the validity of our instrument and reinforce the notion that the direction of causality is more likely to run from audit-firm-level profitability to client-firm-level audit effort and audit outcome.

5.4.4 Lead Audit-Firm Profitability and Audit Outcomes

To mitigate residual concerns regarding the direction of the relation between audit-firm profitability and audit outcomes, in Table 6, panel D we repeat our estimations of equation (2) using the lead value of *EBIT Margin AF*. We fail to find a significant coefficient on *EBIT Margin AF* in all models suggesting that the direction of causality is more likely to run from audit-firm-level profitability to client-firm-level audit effort and audit outcome than the other way around.

6. Conclusion

Theoretical and empirical evidence in economics and management suggests that there is a positive association between firm operating performance and product/service quality. Yet research in auditing lacks evidence on what drives audit-firm profitability and how audit-firm profitability affects audit outcomes. In this paper, we attempt to close this gap in the literature. We compile a novel dataset that links audit-firm and client-firm financial statement information from the U.K. Our objectives are to examine determinants of audit-firm profitability and to explore its consequences for audit outcomes.

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[22] There is one exception: the Wald test has a p-value of 0.37 in model 3 suggesting no endogeneity in the specification where we measure audit quality using *Qualified CF*.

Our determinants analyses reveal that Big-4 and non-Big-4 audit firms have fundamentally different profitability structures. These analyses suggest that larger audit firms are more cost-effective and generate more profits in auditing larger and more complex clients when compared with smaller firms. Consistent with economic theory, our analyses of the relation between audit-firm financial performance and audit quality provide strong evidence that more profitable audit firms exert more effort and deliver higher audit quality. We validate our inferences using five alternative outcome measures: the level of absolute discretionary accruals, the level of accrual estimation errors, the propensity to issue a qualified auditor opinion, earnings restatements, and the level of unexpected KAMs.

In cross-sectional analyses we find that the positive relation between audit-firm profitability and audit quality is generally stronger for more influential and more levered client firms. These findings are consistent with more profitable audit firms being less likely to succumb to client-firm pressure. They are also consistent with litigation considerations incentivizing more profitable audit firms to exert more effort and deliver higher audit quality.[23]

Our study represents a first attempt at understanding the determinants of audit-firm profitability and its implications for audit effort and audit outcomes. Linking audit-firm and client-firm financial statement information introduces an opportunity for audit research to more closely focus on the interplay between audit-firm and client-firm characteristics and the ways through which they determine client outcomes. We encourage future research to explore how audit- and client-firm characteristics interact with each other to affect the whole spectrum of services offered by both large and smaller audit firms.

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[23] As a caveat to our findings, although we implement a variety of research-design approaches to address potential sources of endogeneity, we cannot rule out the possibility that unknown sources of heterogeneity affect our conclusions.

Appendix: Variable Definitions

Client-Firm Variables

|DACC| CF	The value of absolute discretionary accruals as in Kothari et al. (2005). In particular, we estimate the following model for each two-digit SIC code industry with at least 20 observations: $TACC\ CF_{i,t} = a_0 + a_1(1/Assets\ CF_{i,t-1}) + a_2 \Delta Sales\ CF_{i,t} + a_3 Tangibles\ CF_{i,t} + a_4 ROA\ CF_{i,t} + \varepsilon_{i,t}$. We measure total accruals (*TACC CF*) as change in non-cash current assets less change in current non-interest bearing liabilities, less depreciation for firm i in year t, scaled by total assets. Higher values of *|DACC| CF* indicate higher absolute discretionary accruals and lower audit quality.
AQ CF	The Dechow and Dichev (2002) accrual quality measure modified by McNichols (2002). In particular, we estimate the following model for each two-digit SIC code industry with at least 20 observations: $WCACC\ CF_{i,t} = \beta_0 + \beta_1 CFO\ CF_{i,t-1} + \beta_2 CFO\ CF_{i,t} + \beta_3 CFO\ CF_{i,t+1} + \beta_4 \Delta Sales\ CF_{i,t} + \beta_5 Tangibles\ CF_{i,t} + \varepsilon_{i,t}$. We measure working capital accruals (*WCACC*) as change in current assets less change in current liabilities, less change in cash, plus change in short-term debt. We measure cash flow from operations (*CFO*) as net income before extraordinary items less total accruals. *AQ CF* is the 5-year standard deviation of the estimated residuals. Higher values of *AQ CF* indicate more accrual estimation errors and lower audit quality.
AuditorSwitch CF	An indicator variable that takes the value 1 if a client firm switches auditor in a given year, and 0 otherwise.
AvgVariable CF	The audit-firm year mean of the corresponding client firm-year or audit firm-two digit SIC code-year characteristic. This variable is calculated at the audit firm-year level.
Deferred Taxes CF	The ratio of client-firm deferred taxes to client-firm total assets.
Extr. Items CF	The ratio of client-firm extra-ordinary items to client-firm total assets.
Influential CF	The ratio of total fees collected from a given client firm by a given audit firm in a given year to the sum of total fees collected from all client firms in that year.
LagAcquisition CF	The ratio of client-firm acquisitions amount to client-firm total assets, lagged by one year.

LagQualified CF	Variable *Qualified CF,* lagged by one year.
LagTACC CF	Variable *TACC CF,* lagged by one year. We measure total accruals (*TACC CF*) as change in non-cash current assets less change in current non-interest bearing liability, less depreciation for client firm i in year t, scaled by total assets.
Leverage CF	The ratio of client-firm short-term and long-term debt to client-firm total assets.
LnAssets CF	The natural logarithm of client-firm total assets.
LnNumKAMs CF	The natural logarithm of the number of client-firm Key Audit Matters reported by the auditor.
LnNumSubs CF	The natural logarithm of the number of subsidiaries of a given client firm.
Loss CF	An indicator variable that takes the value 1 if a client firm reports negative net income in a given year, and 0 otherwise.
NonAuditFeesRatio CF	The ratio of client-firm non-audit to audit fees.
Problem CF	An indicator variable that takes the value 1 if a client firm restated its earnings over the previous two years, and 0 otherwise.
Public CF	An indicator variable that takes the value 1 if a client firm is publicly listed, and 0 otherwise.
Qualified CF	An indicator variable that takes the value 1 if a client firm receives a qualified auditor opinion, and 0 otherwise.
RecInv CF	The ratio of client-firm receivables and inventory to client-firm total assets.
Restatement CF	An indicator variable that takes the value 1 if a client firm-year is subsequently restated (in either direction), and 0 otherwise.
ROA CF	The ratio of client-firm net income to client-firm total assets.
Sales Growth CF	The percentage change in client-firm sales.
StdSales CF	The standard deviation of the ratio of client-firm sales to client-firm total assets.

Tangibles CF	The ratio of client-firm tangible to total assets.
Unexp. KAMs CF	The residuals from the KAM prediction model of Table 2, panel E.

Audit-Firm Variables

Big4	An indicator variable that takes the value 1 if a client firm is audited by a Big-4 auditor, and 0 otherwise.
Costs AF	The ratio of audit-firm operating costs to audit-firm total assets.
EBIT Margin AF	The ratio of audit-firm operating profit to audit-firm sales.
IndSpec AF	The ratio of the sum of all audit fees received by a given audit firm in a given industry to the sum of all audit fees received by all audit firms in the sample in that industry. We define industries by their two-digit SIC codes. This variable is calculated at the audit firm-two digit SIC code-year level.
Intangibles AF	The ratio of audit-firm intangible to total assets.
LeadEBIT Margin AF	Variable *EBIT Margin AF* in year *t*+1.
LnCash AF	The natural logarithm of audit-firm cash.
LnEmpl AF	The natural logarithm of audit-firm number of employees.
OtherCosts AF	The ratio of audit-firm other costs to audit-firm total assets. We define other costs as audit-firm operating expenses less audit-firm cost of employees.
Revenues AF	The ratio of audit-firm operating revenue to audit-firm total assets.
StaffCosts AF	The ratio of audit-firm cost of employees to audit-firm total assets.

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Table 1: Sample Selection

Panel A: Main sample

All UK private and publicly listed firms in the FAME database with available auditor financial statement information during the period 2008-2020	689,329
Less:	
Firms belonging in the financial sector (SIC codes 60–69)	(159,881)
Private firms that are not subject to mandatory audit	(237,467)
Firm-years with missing data to calculate key variables in the *|DACC| CF* and *AQ CF* regression analyses	(187,127)
Main sample	**104,854**
# of audit firm-years	502
# of audit firms	58

Panel B: Sample used in the qualified opinion specifications

Main sample	104,854
Less:	
Firm-years with positive operating profit	(82,322)
Firm-years dropping due to the inclusion of industry fixed effects in logit specifications	(3,154)
Qualified opinion sample	**19,378**

Panel C: Restatement sample

Main sample	104,854
Less:	
Private firms	(99,021)
Firm-years before 2014	(2,424)
Firms dropping due to the inclusion of industry fixed effects in logit specifications	(1,144)
Restatement sample	**2,265**

Panel D: Sample used in the KAM specifications

Main sample	104,854
Less:	
Private firms	(99,021)
Firm-years before September 2013	(2,128)
Non-premium listed firms with fiscal years ending between September 2013 and November 2016	(983)
KAM sample	**2,722**

This table presents the sample selection procedures. Panel A presents the sample selection procedures for the main sample (sample period: 2008-2020); panel B for the sample used in the qualified opinion specifications (sample period: 2008-2020); panel C for the restatement sample (sample period 2014-2020); panel D for the sample used in the KAM specifications (sample period: September 2013-December 2020).

Table 2: Descriptive Statistics, Correlation Matrix, and KAM Prediction Model

Panel A: Descriptive statistics of variables used in the determinants analyses

Variables	Num. Obs.	Mean	Std. Dev.	Q1	Median	Q3
EBIT Margin AF	502	0.24	0.09	0.19	0.25	0.30
LnEmpl AF	502	5.78	1.60	4.77	5.29	6.36
LnCash AF	502	6.04	3.04	4.38	6.23	7.64
Intangibles AF	502	0.09	0.15	0.00	0.03	0.09
AvgIndSpec AF	502	0.03	0.06	0.00	0.00	0.01
Big4	502	0.10	0.31	0.00	0.00	0.00
AvgPublic CF	502	0.01	0.01	0.00	0.00	0.02
AvgLnAssets CF	502	8.16	0.67	7.63	8.10	8.66
AvgLeverage CF	502	0.31	0.13	0.21	0.28	0.42
AvgROA CF	502	0.04	0.05	0.01	0.04	0.06
AvgLoss CF	502	0.32	0.09	0.27	0.31	0.36
AvgRecInv CF	502	0.19	0.06	0.15	0.18	0.22
AvgStdSales CF	502	0.43	0.16	0.34	0.41	0.49
AvgNonAuditFeesRatio	502	0.29	0.16	0.19	0.28	0.36
AvgInfluential	502	0.01	0.01	0.00	0.01	0.01
AvgLnNumSubs CF	502	0.44	0.15	0.35	0.43	0.53

Panel B: Descriptive statistics of variables used in the outcome analyses

Variables	Num. Obs.	Mean	Std. Dev.	Q1	Median	Q3
Audit-firm characteristics						
EBIT Margin AF	104,854	0.24	0.05	0.20	0.24	0.28
LnEmpl AF	104,854	8.58	1.54	7.94	9.39	9.63
LnCash AF	104,854	10.11	2.57	9.55	10.78	11.98
Intangibles AF	104,854	0.04	0.04	0.02	0.04	0.06
IndSpecialist AF	104,854	0.16	0.13	0.05	0.13	0.23
Big4	104,854	0.66	0.47	0.00	1.00	1.00
Client-firm characteristics						
|DACC| CF	104,854	0.11	0.14	0.03	0.06	0.13
AQ CF	104,854	0.08	0.07	0.03	0.05	0.09
Qualified CF	19,378	0.01	0.10	0.00	0.00	0.00
Restatement CF	2,265	0.14	0.35	0.00	0.00	0.00
Unexp. KAMs CF	2,722	0.01	0.52	-0.65	0.21	0.50
Public CF	104,854	0.06	0.23	0.00	0.00	0.00
LnAssets CF	104,854	10.57	1.55	9.44	10.27	11.38
Leverage CF	104,854	0.30	0.43	0.04	0.19	0.43
ROA CF	104,854	0.05	0.17	0.01	0.04	0.10
Loss CF	104,854	0.22	0.41	0.00	0.00	0.00
RecInv CF	104,854	0.23	0.20	0.05	0.19	0.36
StdSales CF	104,854	0.24	0.38	0.06	0.14	0.29
NonAuditFeesRatio CF	104,854	0.93	1.10	0.00	0.69	1.39
Influential CF	104,854	0.43	2.45	0.00	0.05	0.39
LnNumSubs CF	104,854	0.00	0.01	0.00	0.00	0.00
AuditorSwitch CF	104,854	0.06	0.24	0.00	0.00	0.00
LagTACC CF	104,854	-0.02	0.19	-0.08	-0.01	0.06

Panel C: Correlation between outcome measures and audit-firm characteristics

Variables		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
|DACC| CF	(a)	1.00									
AQ CF	(b)	0.42	1.00								
Qualified CF	(c)	0.01	0.03	1.00							
Restatement CF	(d)	-0.01	-0.03	0.05	1.00						
Unexp. KAMs CF	(e)	0.01	-0.01	-0.02	-0.03	1.00					
EBIT Margin AF	(f)	-0.01	-0.01	0.01	-0.07	0.07	1.00				
LnEmpl AF	(g)	0.06	0.09	-0.04	0.00	0.28	-0.06	1.00			
LnCash AF	(h)	0.07	0.10	-0.02	0.01	-0.12	-0.05	0.76	1.00		
Intangibles AF	(i)	-0.03	-0.04	-0.01	-0.03	0.19	-0.04	-0.20	-0.22	1.00	
IndSpec AF	(j)	0.04	0.05	-0.02	0.02	0.18	0.11	0.50	0.46	-0.17	1.00
Big4	(k)	0.07	0.10	-0.05	-0.01	0.07	0.07	0.71	0.58	-0.35	0.64

Panel D: Correlation between outcome measures and client-firm characteristics

Variables		(a)	(b)	(c)	(d)	(e)	(m)	(n)	(o)	(p)	(q)	(r)	(s)	(t)	(u)	(v)	(w)
|DACC| CF	(a)	1.00															
AQ CF	(b)	0.42	1.00														
Qualified CF	(c)	0.01	0.03	1.00													
Restatement CF	(d)	-0.01	-0.03	0.05	1.00												
Unexp. KAMs CF	(e)	0.01	-0.01	-0.02	-0.03	1.00											
Public CF	(m)	-0.09	-0.06	-0.01	.	.	1.00										
LnAssets CF	(n)	-0.08	-0.12	-0.01	0.08	0.08	0.26	1.00									
Leverage CF	(o)	0.11	0.21	0.02	0.02	0.02	-0.06	0.03	1.00								
ROA CF	(p)	-0.04	-0.11	-0.03	0.01	0.05	-0.07	0.01	-0.35	1.00							
Loss CF	(q)	0.06	0.16	.	-0.01	-0.02	0.02	-0.03	0.27	-0.53	1.00						
RecInv CF	(r)	0.00	-0.06	0.00	-0.05	0.01	-0.07	-0.25	-0.07	0.04	-0.08	1.00					
StdSales CF	(s)	0.24	0.27	-0.01	0.07	0.02	-0.07	-0.15	0.05	-0.02	0.02	0.15	1.00				
NonAuditFeesRatio CF	(t)	-0.11	-0.11	-0.02	0.06	0.08	0.50	0.53	-0.05	0.00	-0.03	-0.08	-0.11	1.00			
Influential CF	(u)	-0.01	-0.01	0.00	0.00	0.02	0.02	0.05	0.00	0.00	0.01	-0.01	-0.01	0.05	1.00		
LnNumSubs CF	(v)	-0.04	-0.05	0.04	0.02	0.04	0.04	0.02	-0.04	0.00	-0.02	0.02	-0.01	0.10	0.04	1.00	
AuditorSwitch CF	(w)	0.05	0.04	0.03	0.03	-0.02	0.01	0.00	0.01	-0.01	0.03	-0.01	0.02	-0.01	-0.02	-0.02	1.00
LagTACC CF	(x)	0.03	-0.09	0.00	0.01	0.00	-0.02	0.02	-0.03	0.04	-0.06	0.04	-0.04	0.00	0.00	0.00	0.00

Panel E: KAM prediction model

Variables	LnNumKAMs CF	
	Coeff.	*t*-stat
LnAssets CF	0.072***	4.19
Loss CF	0.114***	2.68
RecInv CF	0.188	1.23
LnNumSubs CF	0.064**	2.46
Problem CF	0.403***	9.84
LagQualified CF	0.988***	12.95
Intangibles CF	0.090	0.83
Tangibles CF	-0.129	-1.02
LagAcquisition CF	-24.476	-4.56
Extr. Items CF	0.191**	1.99
Sales Growth CF	-0.024	-0.50
Deferred Taxes CF	0.281	0.34
Industry FE	Yes	
Year FE	Yes	
# of client firm-years	2,722	
Adj. R^2	0.137	

Panel A of presents the descriptive statistics for the variables included in the main determinants analyses. Panel B presents the descriptive statistics for the variables included in the analyses examining the relation between audit-firm profitability and audit outcomes. Panel C (panel D) presents Pearson correlations between audit outcome measures and audit-firm (client-firm) characteristics. Bold values indicate significance at the two-tailed 5% level or better. Panel E presents the KAM prediction model used to estimate the level of unexpected KAMs. See the Appendix for variable definitions. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively (two-tailed).

Table 3: Audit-Firm and Client-Firm Characteristics Associated with Audit-Firm Profitability (Determinants Analyses)

Panel A: Audit-firm and client-firm determinants of audit-firm profitability

Variables	*Dep. Var. = EBIT Margin AF*					
	Full Sample		Big-4 Subsample		non-Big4 Subsample	
	Coeff.	*t*-stat	Coeff.	*t*-stat	Coeff.	*t*-stat
LnEmpl AF	-0.019***	-6.12	-0.018	-1.71	-0.019***	-4.68
LnCash AF	0.003**	2.25	0.001	0.38	0.002*	1.74
Intangibles AF	-0.034	-1.57	0.370	0.72	-0.031	-1.44
AvgIndSpec AF	0.110	0.66	0.101	0.43	-0.181	-0.70
Big4	0.046**	2.06				
AvgPublic CF	-0.521***	-2.86	5.538*	1.95	-0.407**	-2.15
AvgLnAssets CF	-0.012*	-1.82	0.842**	2.56	-0.015**	-2.02
AvgLeverage CF	-0.061*	-1.95	0.716	1.48	-0.041	-1.31
AvgROA CF	0.005	0.10	1.627*	1.95	0.024	0.43
AvgLoss CF	-0.098***	-3.19	-0.111	-0.19	-0.089***	-2.95
AvgRecInv CF	-0.065	-1.15	0.036	0.05	-0.048	-0.82
AvgStdSales CF	0.005	0.26	-0.583***	-3.14	0.007	0.35
AvgNonAuditFeesRatio	-0.032**	-2.06	0.031	0.28	-0.040**	-2.54
AvgInfluential	-2.803***	-6.02	-104.139	-0.24	-2.965***	-6.15
AvgLnNumSubs CF	0.033	1.63	-0.430	-0.65	0.042**	2.02
Year FE	Yes		Yes		Yes	
# of audit firm-years	502		52		450	
Adj. R^2	0.208		0.668		0.233	

Panel B: Decomposing Big 4 profitability into revenue and cost component

Variables	Dep. Var. = Costs AF		Dep. Var. = StaffCosts AF		Dep. Var. = OtherCosts AF		Dep. Var. = Revenues AF	
	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat
Costs AF							0.994***	9.80
Revenues AF	0.890***	12.75	0.370**	2.53	0.473***	3.82		
LnEmpl AF	0.078**	2.71	0.840**	2.51	0.161**	2.31	-0.076**	-2.55
LnCash AF	-0.001	-0.12	0.001	0.14	-0.012	-1.15	-0.001	-0.09
Intangibles AF	-0.957	-0.77	1.435	0.55	-1.408	-0.64	2.024	1.49
AvgIndSpec AF	-0.536	-1.05	-0.919	-1.02	-0.577	-0.72	0.393	0.74
Big4								
AvgPublic CF	-27.782**	-2.39	-27.245***	-3.06	-42.420*	-1.81	33.634***	3.31
AvgLnAssets CF	-2.298**	-2.14	-0.280	-0.28	-3.937*	-2.03	2.455**	2.62
AvgLeverage CF	-0.076	-0.07	0.137	0.10	-0.065	-0.03	-0.799	-0.63
AvgROA CF	-3.428	-1.58	2.639	1.04	-3.111	-0.91	3.704	1.65
AvgLoss CF	-2.401	-1.15	-2.329	-0.87	2.571	0.80	2.914	1.41
AvgRecInv CF	5.534	1.53	1.742	0.29	3.978	0.68	-8.418**	-2.29
AvgStdSales CF	0.982**	2.32	-0.257	-0.32	0.591	0.53	-0.913*	-1.92
AvgNonAuditFeesRatio	-0.246	-0.78	0.564	1.21	-0.349	-0.81	0.445	1.27
AvgInfluential	-56.584	-0.06	-405.967	-0.40	678.352	0.16	320.393	0.37
AvgLnNumSubs CF	1.859	0.81	-3.007	-0.97	5.230**	2.28	-2.297	-1.00
Year FE	Yes		Yes		Yes		Yes	
# of audit firm-years	52		52		52		52	
Adj. R^2	0.942		0.618		0.592		0.958	

Panel C: Decomposing non-Big 4 profitability into revenue and cost component

Variables	Dep. Var. = Costs AF		Dep. Var. = StaffCosts AF		Dep. Var. = OtherCosts AF		Dep. Var. = Revenues AF	
	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat
Costs AF							1.130***	38.20
Revenues AF	0.688***	40.37	0.413***	19.10	0.273***	15.01		
LnEmpl AF	0.033***	3.13	0.046***	3.61	0.019*	1.84	-0.023*	-1.79
LnCash AF	0.000	0.16	0.002	0.91	-0.001	-0.22	-0.002	-0.53
Intangibles AF	0.133***	2.89	-0.144***	-3.50	-0.019	-0.39	-0.390***	-6.20
AvgIndSpec AF	-0.278	-0.44	-1.360**	-2.17	-0.208	-0.34	-0.360	-0.50
Big4								
AvgPublic CF	1.015**	2.14	0.244	0.52	1.086*	1.69	-1.742***	-3.02
AvgLnAssets CF	0.038**	2.40	-0.002	-0.13	0.041**	2.19	-0.059***	-2.80
AvgLeverage CF	0.060	0.83	-0.060	-0.93	0.211***	3.49	-0.077	-0.81
AvgROA CF	-0.037	-0.30	-0.030	-0.28	0.032	0.28	0.106	0.60
AvgLoss CF	0.053	0.77	-0.117	-1.48	0.257 ***	3.44	-0.076	-0.84
AvgRecInv CF	-0.223*	-1.85	-0.178	-1.45	0.037	0.27	0.349**	2.13
AvgStdSales CF	-0.010	-0.24	0.013	0.28	-0.024	-0.34	-0.029	-0.50
AvgNonAuditFeesRatio	0.035	0.96	0.118***	3.48	-0.015	-0.28	-0.025	-0.50
AvgInfluential	4.197***	3.64	0.348	0.30	2.892**	2.45	-7.128***	-4.45
AvgLnNumSubs CF	-0.154***	-3.45	0.028	0.64	-0.180***	-4.08	0.191***	3.19
Year FE	Yes		Yes		Yes		Yes	
# of audit firm-years	450		450		450		450	
Adj. R²	0.830		0.626		0.461		0.856	

This table presents audit-firm and client-firm determinants of audit-firm profitability. These analyses cover the period 2008-2020 and include all observable client firms in FAME. Panel A, model 1 presents audit-firm and client-firm determinants of audit-firm profitability for the pooled sample of Big 4 and non-Big 4 accounting firms, whereas model 2 (model 3) presents audit-firm and client-firm determinants of audit-firm profitability for the subsample of Big 4 (non-Big 4) accounting firms (58 Big 4 and non-Big 4 audit firms). In panel B we examine audit-firm and client-firm determinants of Big 4 operating costs (model 1), staff costs (model 2), all other costs (model 3), and operating revenues (model 4). In panel C we examine audit-firm and client-firm determinants of non-Big 4 operating costs (model 1), staff costs (model 2), all other costs (model 3), and operating revenues (model 4). See the Appendix for variable definitions. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively (two-tailed).

Table 4: Audit-Firm Profitability and Client-Firm Audit Outcomes

Variables	Dep. Var. = |DACC| CF		Dep. Var. = AQ CF		Dep. Var. = Qualified CF		Dep. Var. = Restatement CF		Dep. Var. = Unexp. KAMs CF	
	Coeff.	*t*-stat	Coeff.	*t*-stat	Coeff.	*z*-stat	Coeff.	*z*-stat	Coeff.	*t*-stat
EBIT Margin AF	-0.005***	-3.22	-0.003*	-2.00	4.566*	1.73	-4.099**	-2.57	0.826**	2.52
LnEmpl AF	-0.000	-0.61	0.001	1.57	0.005	0.05	-0.077	-1.45	0.031*	1.90
LnCash AF	0.001***	4.88	0.001***	4.14	0.133**	2.19	0.186*	1.75	-0.008	-0.77
Intangibles AF	0.010	0.94	0.005	0.66	-5.775**	-2.46	-6.932	-1.16	0.598**	1.99
IndSpec AF	-0.004	-0.81	0.001	0.18	1.152	1.15	0.130	0.17	0.126	1.62
Big4	0.013***	11.48	0.009***	9.81	-1.955***	-4.62	-0.678***	-3.03	-0.061	-1.28
Public CF	-0.015***	-11.39	-0.000	-0.10	-0.633**	-2.31				
LnAssets CF	-0.002***	-3.52	-0.005***	-11.73	0.078	0.93	0.163	1.49	-0.003	-0.33
Leverage CF	0.040***	16.61	0.031***	13.11	0.168	1.22	-0.048	-0.32	-0.013	-0.31
ROA CF	0.198***	15.36	0.146***	17.41	-0.979***	-2.95	0.290	0.39	0.843***	5.05
Loss CF	0.027***	11.96	0.030***	25.14			0.102	0.44	0.128***	3.40
RecInv CF	-0.048***	-11.68	-0.039***	-14.30	-0.454	-0.74	-1.119	-1.18	0.072	0.91
StdSales CF	0.243***	22.00	0.137***	39.29	-0.819*	-1.76	1.059**	2.49	0.093	1.03
NonAuditFeesRatio CF	-0.000**	-2.16	-0.000	-0.13	-0.061	-0.24	0.392	0.94	-0.006	-0.15
Influential CF	-0.967	-1.25	0.453	0.68	313.939*	1.81	148.159	1.57	54.039***	2.84
LnNumSubs CF	-0.007***	-10.99	-0.002***	-9.04	-0.394***	-4.20	0.000	0.01	0.004	0.28
AuditorSwitch CF	0.020***	9.15	0.006***	3.86	0.895***	4.30	0.075	0.41	-0.050	-1.50
LagTACC CF	0.078***	13.75	0.016***	5.86						
Industry FE	Yes		Yes		Yes		Yes		Yes	
Year FE	Yes		Yes		Yes		Yes		Yes	
# of client firm-years	104,854		104,854		19,378		2,265		2,722	
Adj. R^2/Pseudo R^2	0.122		0.220		0.138		0.141		0.111	

This table presents the regression results of estimating the relation between audit-firm profitability and client-firm audit outcomes. We use the following audit outcomes: the level of absolute discretionary accruals as in Kothari et al. (2005) (model 1), the McNichols (2002) modification of the Dechow and Dichev (2002) accrual quality measure (model 2), the propensity to issue a qualified audit opinion for loss-making client firms (model 3), earnings restatements (model 4), and the level of unexpected KAMs (model 5). See the Appendix for variable definitions. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively (two-tailed).

Table 5: Audit-Firm Profitability and Client-Firm Audit Outcomes – Cross-Sectional Analyses

Panel A: Audit-firm profitability and client-firm audit outcomes conditional on client-firm importance

Variables	Dep. Var. = /DACC/ CF Coeff.	t-stat	Dep. Var. = AQ CF Coeff.	t-stat	Dep. Var. = Qualified CF Coeff.	z-stat	Dep. Var. = Restatement CF Coeff.	z-stat	Dep. Var. = Unexp. KAMs CF Coeff.	t-stat
EBIT Margin AF	-0.001	-1.14	-0.000	-0.16	4.234	1.61	-2.120	-1.07	0.557	1.59
EBIT Margin AF × Influential CF	-4.837*	-1.84	-4.699***	-3.49	376.021	0.19	-1,877.207	-0.99	336.692***	3.24
LnEmpl AF	-0.000	-0.70	0.001	1.51	0.005	0.05	-0.088	-1.60	0.044**	2.08
LnCash AF	0.001***	4.81	0.001***	4.14	0.134**	2.26	0.167	1.54	-0.018	-1.34
Intangibles AF	0.007	0.69	0.003	0.40	-5.701**	-2.51	-7.197	-1.26	0.586	1.47
IndSpec AF	-0.004	-0.94	0.000	0.13	1.158	1.15	0.160	0.20	0.144	1.39
Big4	0.013***	11.57	0.009***	9.61	-1.945***	-4.65	-0.669***	-2.92	-0.029	-0.47
Public CF	-0.015***	-11.26	-0.000	-0.10	-0.633**	-2.31				
LnAssets CF	-0.002***	-3.49	-0.005***	-11.83	0.079	0.94	0.169	1.47	-0.020	-1.55
Leverage CF	0.040***	17.55	0.031***	13.09	0.169	1.21	-0.080	-0.49	-0.005	-0.10
ROA CF	0.188***	15.52	0.146***	17.38	-0.979***	-2.95	0.258	0.36	0.883***	4.11
Loss CF	0.026***	11.91	0.030***	25.09			0.099	0.44	0.138***	2.85
RecInv CF	-0.045***	-11.87	-0.039***	-14.29	-0.454	-0.74	-1.136	-1.19	0.000	0.00
StdSales CF	0.233***	22.89	0.137***	39.33	-0.820*	-1.76	1.078**	2.52	0.146	1.25
NonAuditFeesRatio CF	-0.000**	-2.28	-0.000	-0.13	-0.058	-0.22	0.381	0.89	-0.012	-0.24
Influential CF	0.122	0.11	1.590*	1.93	223.773	0.39	539.344	1.25	2.318	1.19
LnNumSubs CF	-0.007***	-11.30	-0.002***	-8.99	-0.394***	-4.16	-0.006	-0.09	-0.020	-1.24
AuditorSwitch CF	0.019***	8.35	0.006***	3.85	0.895***	4.29	0.067	0.35	-0.058	-1.38
LagTACC CF	0.072***	13.24	0.017***	5.86						
Industry FE	Yes		Yes		Yes		Yes		Yes	
Year FE	Yes		Yes		Yes		Yes		Yes	
# of client firm-years	104,854		104,854		19,378		2,265		2,722	
Adj. R²/Pseudo R²	0.127		0.220		0.138		0.142		0.116	

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Panel B: Audit-firm profitability and client-firm audit outcomes conditional on client-firm leverage

Variables	Dep. Var. = |DACC| CF		Dep. Var. = AQ CF		Dep. Var. = Qualified CF		Dep. Var. = Restatement CF		Dep. Var. = Unexp. KAMs CF	
	Coeff.	t-stat	Coeff.	t-stat	Coeff.	z-stat	Coeff.	z-stat	Coeff.	t-stat
EBIT Margin AF	-0.005**	-2.46	-0.001	-0.76	1.579	0.65	-4.083**	-2.59	0.223	0.71
EBIT Margin AF × Leverage CF	0.003	0.46	-0.007	-0.98	4.977***	2.85	-0.088	-0.03	2.135*	1.95
LnEmpl AF	-0.000	-0.81	0.001	1.59	0.001	0.01	-0.077	-1.46	0.032*	1.88
LnCash AF	0.001***	4.82	0.001***	4.14	0.131**	2.10	0.186*	1.76	-0.009	-0.88
Intangibles AF	0.009	0.88	0.005	0.67	-5.711**	-2.48	-6.932	-1.17	0.601**	2.00
IndSpec AF	-0.006	-1.25	0.001	0.18	1.118	1.07	0.130	0.16	0.128*	1.65
Big4	0.013***	11.05	0.009***	9.90	-1.926***	-4.66	-0.678***	-3.02	-0.061	-1.26
Public CF	-0.016***	-11.70	-0.000	-0.10	-0.682**	-2.54				
LnAssets CF	-0.001**	-2.13	-0.005***	-11.73	0.084	1.01	0.163	1.49	-0.002	-0.21
Leverage CF	0.025***	14.56	0.033***	11.59	-1.114**	-2.44	-0.028	-0.03	-0.519*	-1.93
ROA CF	0.174***	14.87	0.146***	17.41	-0.975***	-2.81	0.289	0.38	0.845***	5.06
Loss CF	0.025***	11.34	0.030***	25.13			0.101	0.45	0.128***	3.41
RecInv CF	-0.045***	-12.26	-0.039***	-14.31	-0.437	-0.71	-1.119	-1.18	0.066	0.83
StdSales CF	0.232***	22.86	0.137***	39.24	-0.785	-1.64	1.059**	2.44	0.086	0.95
NonAuditFeesRatio CF	-0.000**	-2.13	-0.000	-0.12	-0.048	-0.19	0.392	0.94	-0.005	-0.11
Influential CF	-1.506**	-2.08	0.442	0.66	318.375*	1.83	148.107	1.56	53.544***	2.80
LnNumSubs CF	-0.007***	-11.46	-0.002***	-9.05	-0.400***	-4.28	0.000	0.00	0.004	0.30
AuditorSwitch CF	0.019***	8.16	0.006***	3.86	0.896***	4.23	0.075	0.41	-0.048	-1.43
LagTACC CF	0.074***	13.31	0.017***	5.86						
Industry FE	Yes		Yes		Yes		Yes		Yes	
Year FE	Yes		Yes		Yes		Yes		Yes	
# of client firm-years	104,854		104,854		19,378		2,265		2,722	
Adj. R²/Pseudo R²	0.127		0.220		0.141		0.141		0.112	

Panel A (panel B) presents the regression results of estimating the relation between audit-firm profitability and client-firm audit outcomes conditional on the level of client-firm importance (client-firm leverage). We use the following audit outcomes: the level of absolute discretionary accruals as in Kothari et al. (2005) (model 1), the McNichols (2002) modification of the Dechow and Dichev (2002) accrual quality measure (model 2), the propensity to issue a qualified audit opinion for loss-making client firms (model 3), earnings restatements (model 4), and the level of unexpected KAMs (model 5). We measure client-firm importance (*Influential CF*) using the level of total fees collected from the focal client to the total fees received from all clients in a given audit firm-year. We measure client-firm leverage (*Leverage CF*) using the ratio of client-firm short-term and long-term debt to client-firm total assets. See the Appendix for variable definitions. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively (two-tailed).

Table 6: Robustness Tests

Panel A: Controlling for audit-firm and client-firm fixed effects

Variables	Dep. Var. = |DACC| CF		Dep. Var. = AQ CF		Dep. Var. = Qualified CF		Dep. Var. = Restatement CF		Dep. Var. = Unexp. KAMs CF	
	Coeff.	*t*-stat	Coeff.	*t*-stat	Coeff.	*z*-stat	Coeff.	*z*-stat	Coeff.	*t*-stat
EBIT Margin AF	-0.004**	-2.07	-0.018**	-2.66	13.339**	2.21	-17.929***	-3.57	1.438***	3.19
LnEmpl AF	-0.000	-0.33	0.000	0.39	-0.392	-1.22	0.934**	2.10	0.085***	4.35
LnCash AF	0.001***	3.45	0.000***	3.34	0.466*	1.70	0.132	0.59	0.040**	2.38
Intangibles AF	-0.066**	-2.66	-0.016	-1.34	1.268	0.17	14.820**	2.05	4.517***	6.12
IndSpec AF	-0.001	-0.06	0.003*	1.89	0.456	0.24	1.055	1.00	-0.057	-0.85
Big4										
Public CF	-0.008	-0.52	-0.008***	-3.65						
LnAssets CF	-0.050***	-19.59	-0.029***	-29.85	0.674	1.37	0.317	1.07	0.103***	3.74
Leverage CF	0.009	1.49	0.016***	8.29	0.783*	1.74	1.143	1.02	0.122	1.30
ROA CF	0.146***	6.14	0.061***	9.62	-2.216***	-2.74	-2.866*	-1.65	0.240	1.31
Loss CF	0.018***	5.88	0.006***	9.12			-0.285	-0.79	0.011	0.40
RecInv CF	0.003	0.59	0.001	1.14	-1.176	-0.86	-3.424*	-1.67	0.127	0.98
StdSales CF	0.064***	19.60	0.067***	15.90	0.555	0.51	-0.272	-0.25	-0.242**	-2.21
NonAuditFeesRatio CF	-0.000	-0.07	-0.000	-0.26	-1.309*	-1.65	-0.058	-0.13	0.051	1.27
Influential CF	7.591**	2.52	1.429	1.66	214.385	0.32	0.047	0.00	70.487***	3.19
LnNumSubs CF										
AuditorSwitch CF	0.017***	5.57	0.002**	2.46	1.185**	2.05	0.390	1.02	-0.020	-0.90
LagTACC CF	0.063***	12.22	-0.007***	-4.22						
Audit-Firm FE	Yes		Yes		Yes		Yes		Yes	
Client-Firm FE	Yes		Yes		Yes		Yes		Yes	
Year FE	Yes		Yes		Yes		Yes		Yes	
# of client firm-years	104,854		104,854		355		711		2,722	
Adj. R²/Pseudo R²	0.263		0.661		0.187		0.091		0.675	

Panel B: Change in audit-firm profitability and change in client-firm outcomes

Variables	Dep. Var. = Δ|DACC| CF		Dep. Var. = ΔAQ CF		Dep. Var. = ΔQualified CF		Dep. Var. = ΔRestatement CF		Dep. Var. = ΔUnexp. KAMs CF	
	Coeff.	t-stat	Coeff.	t-stat	Coeff.	z-stat	Coeff.	z-stat	Coeff.	t-stat
ΔEBIT Margin AF	-0.005**	-2.50	-0.001**	-2.39	0.308***	2.68	-0.634	-0.33	0.289**	2.15
ΔLnEmpl AF	0.000	0.37	0.000	0.45	-0.033	-0.65	-0.979	-1.23	0.017***	4.31
ΔLnCash AF	0.000**	2.35	0.000	1.42	0.009	0.53	0.041	1.38	-0.002	-0.49
ΔIntangibles AF	0.027	1.21	-0.015*	-1.72	1.670	0.45	-2.314**	-2.06	0.226***	2.75
ΔIndSpec AF	0.002	0.50	0.001	0.24	0.656**	2.07	-0.061	-0.21	-0.050**	-2.18
ΔBig4	0.005	0.85	-0.000	-0.15	0.163	0.54	-0.423	-1.09	-0.018	-1.08
ΔPublic CF	0.000	0.02	-0.002	-0.86	0.043	0.24				
ΔLnAssets CF	-0.110***	-17.31	-0.028***	-27.51	0.028	0.28	0.112	0.95	0.032***	3.05
ΔLeverage CF	0.003	1.01	-0.003**	-2.48	0.710	1.08	0.205*	1.88	0.023	0.89
ΔROA CF	0.009	1.30	-0.009**	-2.59	-0.366**	-2.42	-0.706***	-4.01	-0.034**	-2.04
ΔLoss CF	0.003*	1.89	-0.000	-0.03	-0.110 *	-1.72	-0.146	-1.19	-0.025***	-3.58
ΔRecInv CF	0.031***	5.61	0.005***	3.52	0.192	0.33	-0.798	-0.89	-0.137***	-3.40
ΔStdSales CF	0.065***	18.57	0.014***	11.25	-0.025	-0.36	-0.335**	-1.97	0.033	1.64
ΔNonAuditFeesRatio CF	-0.000	-0.40	0.000	1.52	-0.005***	-3.01	0.004	1.58	-0.000	-0.23
ΔInfluential CF	0.464**	2.59	-0.047	-1.02	522.686	1.18	-1.593	-0.23	1.490**	2.20
ΔLnNumSubs CF										
ΔAuditorSwitch CF	0.014***	6.72	0.002***	2.77	0.311***	4.12	0.029	0.32	0.003	0.50
ΔLagTACC CF	0.107***	18.46	-0.000	-0.69						
Industry FE	Yes		Yes		Yes		Yes		Yes	
Year FE	Yes		Yes		Yes		Yes		Yes	
# of client firm-years	86,148		86,148		19,096		2,257		2,633	
Adj. R²/Pseudo R²	0.077		0.063		0.257		0.043		0.112	

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Panel C: Audit-firm profitability and client-firm audit outcomes – Instrumented (predicted) audit-firm profitability

Variables	Dep. Var. = |DACC| CF		Dep. Var. = AQ CF		Dep. Var. = Qualified CF		Dep. Var. = Restatement CF		Dep. Var. = Unexp. KAMs CF	
	Coeff.	*t*-stat	Coeff.	*t*-stat	Coeff.	*z*-stat	Coeff.	*z*-stat	Coeff.	*t*-stat
Instrumented EBIT Margin AF	-0.045***	-2.64	-0.035***	-4.19	3.768**	1.99	-4.248***	-2.83	1.086**	1.99
LnEmpl AF	-0.000	-0.85	0.000	0.71	0.024	0.52	-0.093	-1.37	0.034*	1.95
LnCash AF	0.002***	5.19	0.002***	10.59	0.027	0.85	0.093*	1.66	-0.011	-0.93
Intangibles AF	0.010	1.10	0.008*	1.83	-2.470**	-2.49	-3.079*	-1.95	0.600**	1.98
IndSpec AF	0.002	0.53	0.005**	2.05	0.263	0.83	0.406	1.27	0.116	1.49
Big4	0.014***	8.83	0.009***	11.39	-0.904***	-6.25	-0.361**	-2.01	-0.069	-1.43
Public CF	-0.018***	-11.48	-0.002**	-2.42	-0.229	-1.38				
LnAssets CF	-0.004***	-11.01	-0.006***	-30.50	0.099***	2.76	0.286***	4.77	-0.002	-0.22
Leverage CF	0.040***	20.67	0.032***	30.35	0.080**	2.04	-0.020	-0.10	-0.013	-0.29
ROA CF	0.222***	21.30	0.166***	31.58	-3.654**	-5.97	-1.755**	-2.49	0.843***	4.86
Loss CF	0.030***	21.81	0.032***	45.94			-0.167	-1.21	0.128***	3.57
RecInv CF	-0.028***	-11.27	-0.029***	-24.63	-0.128	-0.67	-0.765***	-2.61	0.079	1.05
StdSales CF	0.076***	28.72	0.046***	33.16	-0.290*	-1.93	0.787***	3.29	0.093	1.04
NonAuditFeesRatio CF	-0.007***	-15.63	-0.002***	-10.29	-0.148***	-3.46	0.012	0.29	0.004	0.33
Influential CF	-0.000**	-2.13	-0.000	-0.56	-0.002	-0.14	-0.004	-0.38	-0.005	-0.12
LnNumSubs CF	0.522	0.65	1.650***	3.89	3.182	1.79	9.598	1.26	51.809***	2.74
AuditorSwitch CF	0.020***	10.31	0.007***	7.54	0.348***	3.75	-0.022	-0.17	-0.050	-1.55
LagTACC CF	0.076***	16.50	0.005**	2.29						
Industry FE	Yes		Yes		Yes		Yes		Yes	
Year FE	Yes		Yes		Yes		Yes		Yes	
# of client firm-years	104,854		104,854		19,378		2,265		2,722	
Adj. R^2	0.106		0.197						0.110	
Instrument First-Stage Partial F-stat	724.15		724.15		3,701.51		1,311.16		1,404.00	
Wald test of exogeneity (*p* value)	<0.01		<0.01		0.37		0.029		0.047	
Stock-Wright LM S stat. (*p* value)	<0.01		<0.01						0.047	
Hansen J statistic (*p* value)	1.00		1.00						1.00	

Panel D: The relation between lead audit-firm profitability and audit outcomes

Variables	Dep. Var. = |DACC| CF		Dep. Var. = AQ CF		Dep. Var. = Qualified CF		Dep. Var. = Restatement CF		Dep. Var. = Unexp. KAMs CF	
	Coeff.	t-stat	Coeff.	t-stat	Coeff.	z-stat	Coeff.	z-stat	Coeff.	t-stat
LeadEBIT Margin AF	0.001	0.47	0.000	0.01	0.009	0.02	-2.614	-1.49	0.285	0.94
LnEmpl AF	-0.000	-0.35	0.001	1.67	-0.055	-0.54	-0.012	-0.11	0.014	0.85
LnCash AF	0.001***	4.58	0.001***	4.01	0.168***	2.58	0.075	0.57	0.006	0.33
Intangibles AF	0.008	0.71	0.004	0.48	-5.667**	-2.36	-7.165	-1.54	2.023***	3.58
IndSpec AF	-0.005	-1.05	-0.000	-0.06	0.831	1.09	0.698	1.12	0.098	1.10
Big4	0.013***	11.59	0.009***	9.21	-1.564***	-4.88	-0.959***	-2.88	-0.008	-0.16
Public CF	-0.015***	-11.30	-0.000	-0.02	-0.793**	-2.35				
LnAssets CF	-0.002***	-3.55	-0.005***	-11.71	0.056	0.72	0.522***	4.60	-0.005	-0.48
Leverage CF	0.040***	15.89	0.031***	13.13	0.175	1.21	-0.155	-0.45	-0.019	-0.46
ROA CF	0.198***	15.98	0.146***	18.16	-0.954***	-2.84	-0.122	-0.12	0.854***	4.97
Loss CF	0.027***	12.34	0.030***	26.20			0.120	0.45	0.130***	3.34
RecInv CF	-0.049***	-12.08	-0.040***	-14.51	-0.503	-0.82	-1.375**	-2.50	0.051	0.63
StdSales CF	0.244***	22.16	0.137***	39.16	-0.948*	-1.85	1.995***	3.13	0.091	1.58
NonAuditFeesRatio CF	-0.000**	-2.16	-0.000	-0.13	-0.057	-0.22	0.080	0.27	0.002**	2.31
Influential CF	-1.097	-1.35	0.393	0.58	433.568***	2.85	180.773	1.51	62.254***	3.22
LnNumSubs CF	-0.007***	-10.69	-0.002***	-9.07	-0.408***	-4.25	-0.001	-0.02	0.008	0.61
AuditorSwitch CF	0.020***	9.46	0.006***	3.96	0.890***	4.11	0.133	0.55	-0.052	-1.52
LagTACC CF	0.080***	13.89	0.017***	5.74						
Industry FE	Yes		Yes		Yes		Yes		Yes	
Year FE	Yes		Yes		Yes		Yes		Yes	
# of client firm-years	109,913		109,913		19,196		2,162		2,586	
Adj. R²/Pseudo R²	0.122		0.220		0.137		0.151		0.113	

In Panel A we re-estimate the relation between audit-firm profitability and client-firm audit outcomes after controlling for audit-firm and client-firm fixed effects. In panel B we examine the relation between changes in audit-firm profitability and changes in client-firm audit outcomes. In panel C we examine the relation between instrumented (predicted) audit-firm profitability and client-firm audit outcomes. We use the ratio of audit-firm tax expense to audit-firm total assets as instrument for audit-firm profitability. In panel D we estimate the relation between lead audit-firm profitability and client-firm audit outcomes. We use the following audit outcomes: the level of absolute discretionary accruals as in Kothari et al. (2005) (model 1), the McNichols (2002) modification of the Dechow and Dichev (2002) accrual quality measure (model 2), the propensity to issue a qualified audit opinion for loss-making client firms (model 3), earnings restatements (model 4), and the level of unexpected KAMs (model 5). See the Appendix for variable definitions. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively (two-tailed).