Do consulting services affect audit quality?
Evidence from the workforce

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Abstract

In this paper we investigate how consulting services affect audit quality using a comprehensive office-level dataset of employment profiles, covering approximately 86% of all employees at large U.S. public accounting firms. We start with interviews with 15 audit partners, which reveal that consulting expertise is used in approximately 60%-80% of audit engagements, and that the main rationale for such collaboration is knowledge sharing and improved audit quality. In our empirical analyses, we document a positive effect of consulting employees on audit quality. Specifically, a one standard deviation increase in the share of consulting employees in an office results in a 2.7 percentage point reduction in restatements (a decrease of 19% relative to the baseline). This effect is strongest when consulting employees have skills complimentary to auditors, such as special industry, technical, and management skills, supporting the knowledge sharing hypothesis. In addition, we demonstrate that the effect increases with consulting employees' tenure, does not diminish over time, is present for both Big4 and non-Big4 firms, and is more pronounced for larger, more complex, and more important audit clients.

Keywords Consulting; Employee skills; Skill complementarity; Audit quality; Labor effects

JEL classification D22, E24, J24, M42

1. Introduction

Public accounting firms tend to be comprised of several business lines: audit services are housed side-by-side with consulting and tax practices. This composition of accounting firms has contributed to an active debate among practitioners, regulators, and academics. Some argue that housing consulting and advisory practices in the same firms as audit is detrimental to core businesses such as audit, due to a lack of auditor independence and potential diversion of resources (PCAOB 2015; FRC 2020). Others point out that the consulting practice can actually improve audit quality through synergies such as knowledge sharing (Simunic 1984, Kinney et al. 2004, Christensen et al. 2015). The debate is becoming ever more urgent due to recent tremendous growth in consulting services (Donelson et al. 2020, Cowle et al. 2021) and the resulting potential shift in resources. In its five-year strategic plan for 2015 through 2019, the PCAOB highlights "challenges of anticipating the implications of the expansion of consulting" on audit quality among the main threats to achieving its mission. This paper directly responds to these challenges and provides important insight to inform the debate among regulators, auditors, and market participants.

To evaluate the necessary tradeoffs, we need to answer a fundamental question: How does the presence of consulting services in accounting firms affect audit quality? Understanding how these two core activities develop and affect each other is critical to understanding potential costs and benefits. Specifically, the main tradeoff is between the potential for consulting services to divert resources (e.g., attention, investments, and personnel) away from audit versus the potential for expertise from the consulting practice to complement audit work (Donelson et al. 2020).[1] In

[1] There is also a debate about potential conflicts of interest if consulting services are sold to an audit client. However, the Sorbanes-Oxley Act (Section 201) prohibits providing consulting services to audit clients and limits services that are permissible, which are reported as non-audit services (NAS).

order to assess which effect dominates, we need to measure the actual presence of consulting work and observe its relationship to audit quality.

Addressing this question is difficult due to the lack of granular data on consulting activities at audit firms. Existing evidence on the effects of consulting services on audit quality is mixed and limited to indirect proxies such as aggregate firm-level consulting fees from the *Accounting Today* database (Lisic et al. 2019), acquisitions of consulting businesses by audit firms (Donelson et al., 2020), and client- and office-level non-audit service fees (NAS) related to non-audit services provided to audit clients, which are reported in the *Audit Analytics* database (e.g., Paterson and Valencia 2011, Causholli et al. 2014, Beardsley et al. 2021).[2] Understanding how the consulting workforce interplays with auditors' work requires both quantitative and qualitative measures of the consulting workforce in each accounting firm's office, including this workforce's size, composition, and types of expertise. But these measures have not been available to date.

We circumvent the previous data availability challenge by bringing a unique and comprehensive office-level dataset of employment profiles from Cognism, Inc. The Cognism dataset covers approximately 86% of all employees at large U.S. public accounting firms and includes their current and previous jobs, educational backgrounds, and demographics over the last decade: from 2010 to 2019. Most importantly, the employment profiles include employees' self-reported skills: for example, whether someone is skilled in *Financial Reporting* or *Microsoft Excel* or *Python*. We use the machine learning methodology introduced in Fedyk and Hodson (2020) to structure tens of thousands of different self-reported skills into broad categories of skillsets, e.g.,

[2] NAS fees generally represent a small fraction of consulting revenues (on average, NAS fees are 4.7% of total consulting revenues for our sample period), are largely performed by tax and not consulting specialists (the most common NAS are tax-related services), and are reported only for public audit clients, and therefore represent only a small portion of all consulting services provided by audit firms.

the *Accounting* skillset, the *Technical* skillset, and the *Management* skillset. Using this classification, we assign each employee into one primary broad skillset. The unique skill data allow us to explore which specializations of the consulting workforce are helpful to audit, and which may be detrimental.

To guide our empirical analyses, we first conduct 15 interviews with audit partners from the 8 largest U.S. public accounting firms. These interviews reveal that audit partners uniformly expect the presence of consulting practices at their firms to be *beneficial* to audit quality, especially as financial statements become more and more sophisticated, requiring numerous areas of special expertise. Audit partners point out that consulting expertise is currently used in approximately 60%-80% of audit engagements, earns up to 15% of audit fees, and the main rationale for such collaboration is knowledge sharing and improved audit quality. In terms of mechanisms for how the consulting workforce helps improve audit quality, audit partners consistently highlight (1) specific expertise from consulting that may not be present among auditors, especially technical skills and specific industry knowledge, and, to a lesser extent, (2) the additional workforce available to help with audit.

Motivated by the insights from the interviews, our empirical analysis proceeds in two steps. First, we test the main hypothesis: that the consulting workforce helps improve audit quality. Second, we delve into the mechanisms and explore how complementarity in skills plays into our main result. For the first step, we regress measures of audit quality on the size of the consulting workforce in each audit firm office. To assess audit quality, we look at restatements, which are considered the most direct proxy for audit quality (e.g., DeFond and Zhang 2014; Christensen et al. 2016; Aobdia 2019; Beardsley 2021). We document that a one-standard-deviation increase in the percentage of consulting employees in an office results in a 2.7 percentage point reduction in

restatements in that office (which corresponds to a relative decrease of approximately 19%), as well as a 0.5 percentage point reduction in material restatements[3] and a 1.1 percentage point reduction in restatements related to revenue and accruals. This result is very robust: it is present for both Big-4 and non-Big-4 firms, does not diminish over time, holds at the firm-level, and is more pronounced for larger, more important, and more complex audit clients, consistent with these audits requiring more auxiliary expertise. Moreover, when we examine three alternative proxies of audit quality highlighted by Aobdia (2019)—audit fees, the propensity of meeting/beating analysts' forecasts, and accruals—we find additional support for our main hypothesis that the consulting workforce helps improve audit quality. The share of consulting employees is positively associated with audit fees, negatively associated with the propensity to barely meet/beat analysts' forecasts, and negatively (though insignificantly) associated with accruals.

In the second step of our analysis, in order to directly test the knowledge sharing hypothesis, we dig deeper into the composition of the consulting workforce and how it can help audit quality. Audit partners in our interviews point out that the consulting workforce can bring complementary skills that can be leveraged by auditors to improve the audit process, such as industry-specific valuation expertise or special technical skills that help assess internal controls, etc. Motivated by this insight, we explore whether consulting employees have a larger effect on audit quality when their skills are more complementary to the skills of auditors. To measure skill complementarity, we compute the chi-square statistic between the distributions of skills of auditors and consultants in a given office. The higher this statistic, the more consulting employees' skills differ from their auditing counterparts—suggesting more potential for complementarily and

[3] Material restatements are defined as restatements disclosed in Form 8-K item 4.02 filing (Audit Analytics: DATE_OF_8K_402).

knowledge spillovers. We find that consulting employees' ability to reduce the probability of restatements is greater in offices where their skills are significantly different from those of auditors.

We dig deeper into which skills of consulting employees are most helpful to audit. For each skillset, we split the sample into high versus low shares of that skillset among the consulting employees in a given office and then estimate the effect of consulting employees on audit quality within each subsample. We document that the positive effect of the consulting workforce on audit quality is *greater* when a higher share of consultants is skilled in *Specific Industries*, *Technical* skills (such as data analysis and software engineering), and *Management* skills, supporting the knowledge sharing hypothesis. By contrast, consulting employees have a lower effect on audit quality when they have mostly *Accounting* skills, since those skills do not add as much novel expertise on top of auditors' existing expertise.

Finally, we explore how employee experience plays into our findings. We consider both auditor and consultant tenure with an audit firm. In the knowledge sharing hypothesis, we expect consulting employees to have a greater positive effect on audit quality if they have more experience. By contrast, we expect consulting employees to affect audit quality to a lesser degree when auditors have longer firm tenure, as more experienced auditors are more self-sufficient and rely less on outside expertise. This is corroborated in the data. The effect of consulting employees on audit quality increases with the average firm tenure of consulting employees but declines with the average firm tenure of audit employees.

Overall, our results support knowledge sharing between consulting and audit employees within accounting firms, which helps improve audit quality. This contributes to the growing literature on the effects of consulting services on audit quality in several ways. First and foremost, we tackle this question from a new angle: from the angle of the employees who are the source of

the knowledge and expertise within audit firms. We accomplish this through a detailed exploration of accounting firms' office-level workforce composition and characteristics. This allows us to directly test the knowledge sharing hypothesis and find robust evidence supporting this theory. Second, by using a unique and comprehensive dataset of audit firms' employee profiles, we are the first to demonstrate that complementarity of skills between audit and consulting employees has a significantly positive effect on audit quality. In addition, we show which specific consulting employees' skills contribute the most to audit quality. Finally, we add to the literature by demonstrating the positive effect of consulting employees' firm tenure on audit quality.

Our evidence of a positive relationship between public firms' consulting services and audit quality is also very relevant to current policy debates. The significant growth in consulting services in public accounting firms in recent years has led to discussions about potential splits of services. For example, Britain's Financial Reporting Council has suggested operationally splitting Big 4 public accounting firms into separate accounting and consulting entities by 2024 (FRC 2020). Business press in the U.S. has reported on the potential split of consulting services in Deloitte and Earns & Young (Eaglesham and Driebusch 2022, Eaglesham and Maurer 2022). PCAOB (2015) has raised concerns regarding the potential effects of consulting services on audit quality. There are many angles to consider, but our paper provides color on one important dimension: knowledge sharing and expertise cross-usage across consulting and audit departments in accounting firms, which can lead to higher audit quality.

The remainder of the paper proceeds as follows. Section 2 discusses the institutional background and the related literature and then summarizes insights from interviews with audit partners. Section 3 introduces our comprehensive resume dataset and discusses the construction of

the firm-level data and data on employees' specific skills. Section 4 presents empirical results related to consulting human capital and audit quality. Section 5 concludes.

2. Background, literature and interviews with audit partners

Public accounting firms provide assurance, tax, and consulting services to their public and private clients. After a chain of accounting scandals, the Sarbanes-Oxley Act of 2002 (SOX) banned consulting services for audit clients and limited non-audit services (NAS) that are permissible for audit clients.[4] While consulting services for non-audit clients have not been prohibited, as a result of this new legislation, all accounting firms substantially reduced their consulting services. Lisic et al. (2019) report that for the Accounting Today Top 100 Firms consulting revenues contributed to around 48% of total revenues in 2000 and less than 20% of total revenues in 2004. Furthermore, three of the four major accounting firms sold their consulting practices after SOX. However, starting in 2009, consulting revenues began to grow again. By 2020, consulting revenues reached 35% of total revenues for the Accounting Today Top 100 Firms and 40% of total revenues for the Big 4 accounting firms, making consulting the service line with the highest percentage of total revenues. The renewed growth of consulting services has resurfaced questions and concerns related to possible negative effects of consulting on audit work in general and on audit quality in particular (PCAOB 2015; FRC 2020). On the one hand, in its five-year strategic plan for 2015 through 2019, the PCAOB suggests that it has the opportunity to further its mission by addressing the expansion of consulting services at large accounting firms, and it identifies difficulties in understanding the implications of the expansion of consulting services for audit quality as a threat

[4] Section 201 of the Sarbanes-Oxley Act lists nine non-audit services that, if provided by the accounting firm, impair the firm's independence.

to achieving its mission. On the other hand, accounting firms in their annual audit quality reports express the opinion that special subject matter knowledge and expertise of consulting employees can positively affect the quality of audits (see section 2.3). We contribute to this debate by considering office-level data on the consulting workforce and by demonstrating that consulting employees positively affect audit quality due to knowledge- and expertise-sharing.

2.1 Related literature: consulting and audit quality

Despite the importance of the question and rather intensive research on this topic, existing evidence on the effects of consulting services on audit quality is somewhat inconclusive and limited in scope. Due to the proprietary nature of information on consulting services performed by audit firms, most of the literature uses non-audit service fees (NAS) disclosed by public audit clients as the best available proxy for consulting services, finding mixed evidence. Some papers find evidence of a negative association between non-audit fees and audit quality, suggesting that independence concerns are valid when audit and non-audit services are provided to the same client (DeAngelo 1981, Kinney et al. 2004, Paterson and Valencia 2011, Beardsley et al. 2019).[5] Others posit that providing non-audit services to audit clients can lead to beneficial knowledge spillovers between the two services, which can enhance audit quality (Simunic 1984). This theory is supported by the empirical finding that tax-related non-audit services positively affect audit quality (Kinney et al. 2004, Gleason and Mills 2011, Christensen et al. 2015). Finally, some studies document a null association between the provision of non-audit services and audit quality (DeFong et al. 2002, Ashbaugh et al. 2003, Callaghan et al. 2009).[6] A recent paper by Beardsley et al. (2021)

[5] Since 2003, the SEC requires public companies to disclose their audit fees and three types of non-audit fees (tax-related, audit-related and the other NAS fees) on the grounds that such data may be useful.
[6] See Bouwens (2018) for a review of the existing literature on the relationships between audit quality and non-audit services.

adds an interesting twist to the debate by looking at the office-level NAS (i.e., non-audit service fees collected from all public audit clients in the office) to proxy for the distraction effect that may arise when resources are diverted from the audit function to non-audit related services. They find a negative correlation between office-level NAS and audit quality in addition to the previously documented negative correlation between client-level NAS and audit quality.

There are two notable exceptions to the literature that uses NAS fees as a measure of the extend of consulting services provided by audit firms: Donelson et al. (2020) and Lisic et al. (2019). Donelson et al. (2020) explore acquisitions of consulting practices by Big 4 firms and provide evidence for both sides of the debate. When audit firms acquire a consulting practice unrelated to auditing, that negatively affects audit quality, consistent with the notion of distraction of resources; but when the acquisition is audit-related, audit quality increases, in line with the knowledge sharing theory. Lisic et al. (2019) use total firm-level consulting revenues from Accounting Today. They find that consulting revenues negatively affect audit quality in the pre-SOX period (2000-2002), but there is no significant association between firm-level consulting revenues and audit quality in the post-SOX period (2003-2013).[7]

Our paper takes a different approach from all aforementioned papers on consulting and audit quality. In this paper, we directly focus on consulting *employees* and their *skills,* because employees represent the real workforce behind any interactions. We directly test the hypothesis of knowledge and expertise sharing between consulting and audit practices. Specifically, 1) we use granular and extensive office-level data on consulting employees for the 32 largest public

[7] We were able to replicate Lisic et al. (2019) firm-level results using our firm-level data on the number of consulting employees. Interestingly, when we did a comprehensive year-by year firm-level analysis, we discovered that indeed, in the post-SOX period (up to 2010) there is no significant association between the firm-level consulting employees and audit quality. But starting from the year 2011, the association becomes significantly positive. For robustness, and given insights from interviews with audit partners that some interactions between audit and consulting happen on firm-level, we replicated our main office-level results on the firm-level as well (Section 4.2).

accounting firms; 2) we guide our analysis with insights from semi-structured interviews with audit partners about their interactions with consulting employees; and 3) we explore employees' specific skills and characteristics to directly assess their effects on audit quality.

2.2 Related literature: employees' specific skills and characteristics and audit quality

Despite a voluminous literature on firm- and office-level determinants of audit quality, there is a dearth of empirical evidence on whether and how individual employee characteristics affect audit quality. The main barrier to addressing this question is data availability. To date, the approaches used by researchers to overcome the lack of data on individual employees have included: using more readily available macro data to draw inferences about the pool of local employees; drawing inferences from surveys and experiments; and, more recently, using job postings data to draw inferences about the demand for labor. For example, Beck et al. (2018) use geographic data on the size and general education level of the labor force in the audit office's city to assess how local labor characteristics affect audit quality. They find a positive association between audit quality and the average education level in the city in which the engagement office is located. Bonner and Lewis (1990) conduct a field study and find that knowledge and innate ability to perform specific audit tasks are more important in determining audit performance than auditors' experience. In another field study, Bol et al. (2018) provide evidence that technical knowledge (or technical skills) and tacit knowledge (or social skills) among staff and senior auditors are associated with better performance. In a recent study, Ham et al. (2022) use job postings data to analyze demand for specific auditors' skills and to explore a possible association between these skills and audit quality. They study three types of skills—cognitive, social, and technology-related—and find that the demand for social skills among auditors has the strongest relation with audit quality.

In our paper, we focus on actual employees of accounting firms, and we explore individual skills and other personal characteristics of both auditors and consultants. Examining these individual skills and the complementarity between auditors and consultants' skills allows us to directly test how knowledge sharing can contribute to audit quality (Simunic 1984).

2.3 Use of specialists and audit quality: insights from Big 4 annual audit quality reports

In our paper, we study how consulting specialists in accounting firms affect audit quality.[8] PCAOB standard AS 1210 (2016) regulates the work of auditor-engaged specialists and specifically defines a specialist as a person (or firm) *possessing special skill or knowledge* in a particular field other than accounting or auditing.

The question of how auditor-engaged specialists might affect audit quality is sufficiently important to be directly addressed in annual audit quality reports by the majority of large public accounting firms, including all Big 4 firms. The reports deliver a clear message that non-audit specialists are active contributors to audit quality. For example, the Deloitte 2021 Audit Quality Report states that: "At Deloitte, we see our robust multidisciplinary model—consisting of our audit and assurance, risk and financial advisory, tax, and consulting services—as an indispensable asset that contributes to the quality of our audits" (p.22).[9] In a similar vein, PWC's 2021 Audit Quality Report states that: "Drawing on the knowledge and experience of our non-audit professionals, we develop a deeper understanding of our audit clients' processes and financial reporting risks, which leads to a better audit" (p.8).[10] Moreover, we see that interactions between auditors and non-audit

[8] For the purpose of this paper, and consistent with the existing accounting literature, we refer to consulting and advisory services employees of audit firms as "consulting" employees. During our interviews with audit partners, we noted that they also use these two terms—consulting and advisory—interchangeably, with a slight preference for the term "advisory."

[9] https://www2.deloitte.com/content/dam/Deloitte/us/Documents/audit/us-audit-quality-report-2021.pdf

[10] https://www.pwc.com/us/en/services/audit-assurance/assets/pwc-2021-audit-quality-report.pdf

specialists are very common and happen on a regular basis. EY's 2021 Audit Quality Report discusses the use of non-audit professionals' expertise to support "audit practice by consulting with teams on difficult accounting, auditing, and SEC and other regulatory matters" (p.36), and that over the last three years, these experts have conducted an average of 2,250 formal consultations annually with audit teams (p.52).[11]

Interestingly, for non-audit employees involved in audits, audit quality in their audit engagements can directly impact compensation. For example, KPMG's 2021 Transparency Quality report states that: "Members of engagement teams, including Advisory and Tax professionals supporting the audit, are encouraged to plan their development as a team, in a manner that supports the delivery of a quality audit" (p.18), and that "one of the factors considered in the compensation of Tax and Advisory partners who participate in audit engagements is their performance relative to audit quality" (p 20).[12]

Finally, consulting employees contribute a significant amount of effort and expertise to audit work. This is reflected in audit fees, which contain a large portion earned by auditor-engaged specialists. For example, in the EY 2021 Audit Quality Report, the section related to professional groups supporting audit practice states that: "Our Assurance service line generated 27% of EY U.S. revenue. Our other service lines, Consulting, Tax, and Strategy and Transactions, generated 33%, 29% and 11% of our revenue, respectively. A portion of the revenue of those service lines relates to their professionals' time spent on our audits. If that revenue were included in our Assurance service line, Assurance would have been our largest service line, accounting for 32%

[11] https://assets.ey.com/content/dam/ey-sites/ey-com/en_us/topics/assurance/2021-our-commitment-to-audit-quality-report/ey-2021-auditqualityreport-final.pdf
[12] https://audit.kpmg.us/content/dam/audit/pdfs/2022/2021-transparency-report.pdf

of EY U.S. revenue" (p.13).[13] Similarly, KPMG's 2021 Approach to Audit Quality Report states that: "In addition to audit hours performed by core Audit professionals, our Center for Audit Solutions executed more than 13% of audit hours in fiscal year 2021, while professionals with specialized skills across our Tax, Advisory and Audit practices accounted for nearly 13% for all engagements" (in the section "Promoting standardization and quality").[14]

2.4 Consulting and audit: insights from interviews with audit partners

To better understand the scope, timing, potential costs and benefits, and mechanisms behind partnerships between audit and consulting employees at U.S. public accounting firms, we conducted 15 semi-structured interviews with audit partners from the eight largest U.S. public accounting firms.[15] Big 4 firms were represented by eight partners, and mid-tier audit firms (Grant Thornton, BDO, RSM/McGladrey, and Moss Adams) were represented by seven partners. The interviewees had different firm tenures and years of experience (from 14 to 36 years, with an average experience of 25 years) and represent large and mid-size offices. Interviews took place over the three-month period from May 2022 to August 2022. Each interview lasted from 30 to 62 minutes and was recorded conditional on formal approval from the interviewee, in addition to notes taken by at least two interviewers. The interviewees were assured of their anonymity. We developed the semi-structured interview script in-line with best practices in the literature (Austin et al. 2021). Our interview questions centered around the interaction between audit partners and their consulting colleagues.

The first set of questions was related to the extent to which auditors interact with the consulting employees and specific mechanisms behind such interaction. Responses from Big 4 and

[13] https://assets.ey.com/content/dam/ey-sites/ey-com/en_us/topics/assurance/2021-our-commitment-to-audit-quality-report/ey-2021-auditqualityreport-final.pdf
[14] https://www.kpmg.us/about/kpmg-esg-report/kpmg-esg-audit-quality.html
[15] The interviews were approved by the Institutional Review Board (IRB) at the University of San Francisco.

non-Big 4 auditors reveal that auditors at all firms actively and regularly collaborate with consulting practices in their firms. Consulting services are used to assist with audits for both public and private clients. Consistent with insights from Big 4 annual audit quality reports discussed in Section 2.3, all our interviewees confirmed that they regularly engage consulting services for audit support, pointing out that in this context *"Consulting is an extension of the audit team."* Specifically, responses ranged from collaborating with consulting employees on 25% of audit engagements to practically 100% of engagements (*"There is not a week when I do not consult with consulting practice"*), with the majority of responses in the range of 60-80%.[16] As one of the Big 4 partners summarized it:

> *"The Audit profession acts as a catalyst: we connect with different stakeholders (legal people, regulatory people, strategy people, etc.) to learn in-depth about the companies and what's on their agendas."*

The main reasons for auditors to involve consulting employees in their work are audit support and audit quality: *"Consulting adds value and increases quality."* Consulting experts tend to engage in very specific and complex areas, which are more prone to errors or misstatements without experts: e.g., complex derivative instruments, hedge accounting issues in financial services, and fintech. In addition, improved audit quality and engagement of subject matter experts in audits serve as a retention tool for clients. In terms of in-house use of subject matter experts versus acquiring external expertise, the interviewees pointed out that: *"In general, outsourcing experts' work is very undesirable in terms of security and especially in terms of audit quality: we are confident in our consulting employees, as they follow the same quality standards."* We also

[16] While tax consulting is out of the scope of this paper, our interviews yielded the insight that: "*If we consider involvement of both consulting and tax people, their help is used in almost 100% of engagements*".

learned that consulting employees with accounting backgrounds (mostly at the entry level) can provide extra labor help and add flexibility to the auditors' work, especially during the high season: *"Junior consulting employees rotate for 6 months and go work for audit. That way we increase auditor capacity during the busy season. They will go back to consulting work after the rotation."*

According to our interviewees, requests for special expertise for audit support can be made either through an automated system or in a more informal process, where the audit partner can call a consulting partner who is a specialist in a specific area. Most interactions between audit and consulting are initiated at the top (partner-to-partner) level (*"It starts at the top and then goes down to the people who actually perform the work"*) and are typically planned in the early stages of the audit as a *"teamwork engagement across different lines of service that makes knowledge available across different places."* As one interviewee concisely summarized, *"Support for audit is a mandatory task for those professionals. For consulting partners, auditors are clients—internal clients, but with the same access to their services and expertise as external clients."*

When asked about time trends, most of our interviewees agreed that collaboration between audit and consulting has been present over the last ten years but has grown over time: *"Involvement of certain specialists in the audit process has grown over time, especially as financial statements become more and more sophisticated, and numerous areas of non-accounting and non-CPA expertise are needed."*

In terms of office- vs. firm-level interactions, the majority of responses revealed that interactions often start at the office level and then move to the firm-level if required expertise is not available at the office-level: *"In most cases, we use office interactions, as we have a large population of specialists, and we know them personally. In general, it's a matter of: "Do I personally know someone who can help?" If not - go to the firm-level."*

The second set of questions was designed to provide an in-depth understanding of specific industries and clients where interactions between auditors and consulting employees are most prevalent. In terms of specific industries, according to our interviewees: *"The use of consulting expertise and knowledge is prevalent in all industries. Pretty much everywhere you need special expertise."* Interviewees provided the following examples of expertise that helps auditors' work and improves audit quality: 1) purchase accounts and fair value expertise, 2) valuation expertise in almost all industries; 3) stock-option valuation; 4) technical accounting with specific expertise for complex non-recurring transactions; 5) internal control expertise. In terms of specific clients, according to our interviewees, special expertise is *"more useful for larger clients and publicly-traded clients, and complexity of the client is also going to play a role."*

The third set of questions focused on specific skills that bring the most value to audit work. As noted by one national audit leader with significant audit experience:

> *"Audit business has become very complicated over time: fair value accounting, assets impairment, business combinations, auditing IT controls, etc. Auditors need to understand different situations, systems, and approaches. There is a much better, wider, and richer skillset in consulting to address those special situations."*

When asked about specific skills that are most valuable in consulting employees who assist with audits, all interviewees agreed on special skills related to valuation that requires industry-specific expertise and technology (IT) expertise: *"Valuation and IT specialists are part of the consulting services. They provide similar services to other non-audit clients, and that way they are very knowledgeable and experienced in these areas."* Other skills highlighted by audit partners

include: management skills, organizational skills, technical accounting, and internal control specialists.

Finally, our interviews offered interesting insights into how potential separation of audit and consulting services can affect audit quality. Some partners are neutral with their expectations and look forward to observing what happens, and some others see separation of services as a cyclical process and expect that separation would lead to re-growth of consulting services in audit firms in the future. However, the majority of auditors expressed serious concerns with potential separation of audit and consulting services: *"We think we need our multidisciplinary practice. There might not be effective audit if we do not have these practices,"* and even *"The audit firm cannot survive without consulting. If they split, they would have to build it up again. Otherwise, audit quality will suffer."*

To sum, our interviews reveal that consulting is considered an important part of audit work, because it helps with audit quality and efficiency. The highest potential impact of consulting on audit quality is in areas requiring special industry knowledge and technology expertise and in areas that are *"very specific and complex."* Importantly, there is an expectation among audit partners of even higher future demand for knowledge sharing provided by consulting employees, especially as accounting standards become more and more advanced.

3. Sample, data, and measures.

3.1 Data

We leverage a unique dataset of individual employee resumes from Cognism, a client relationship management company that aggregates individual resumes from third party providers, partner organizations, and online profiles. This dataset is maintained in compliance with data protection

policies including the latest EU General Data Protection Regulation (GDPR) and California Consumer Privacy Act (CCPA). The dataset contains 3.4 billion work experiences from 535 million individuals, spanning more than 30 years and over 22 million organizations globally, including public companies, private firms, small and medium-sized enterprises, family-run businesses, non-profits, governmental entities, universities, military organizations, etc. The dataset includes the following general information on individuals: a unique identifier, city and country level location, an approximate age derived from the individual's education record, gender classified based on the first name, social media linkages, and a short bio sketch. For each of their employment records, the individuals in the data can list the start and end dates, the job title, the company name, and the job description. Similarly, each education record includes start and end dates, the name of the institution, the degree earned, and the major. In addition, individuals tend to include other relevant information on their resumes, including their skills, patents, awards, publications, and similar attainments.

The Cognism data are enriched with state-of-the-art machine learning techniques to identify employees' departments and seniority. Over 20,000 individual job titles are classified manually based on specified department ("Audit", "Consulting", "Tax", and "Other"[17]) and markers of seniority (e.g., "Associate"). The remaining job titles are then classified into departments using a probabilistic language model and into seniority levels using an artificial neural network. Several research assistants independently manually reviewed an additional sample of over 10,000 positions to assess the model's output. This confirmed that Cognism's classification

[17] The "Other" group is mainly comprised of human resources, IT and administrative support, and all other unclassified employees.

model classifies individuals into departments with a very high accuracy rate—93%—allowing us to accurately capture consulting versus audit employees.

In order to link workforce data to outcome variables such as restatements, we merge the Cognism data to Audit Analytics. This process involves standardizing the resume data, since employees often list their company names in very different ways (e.g., "PricewaterhouseCoopers" vs. "PwC"). For each firm in Audit Analytics, we use textual analysis to identify different references to the same firm in the resume data. We restrict our final sample to the firms in Audit Analytics that are matched to at least 100 employees in the Cognism resume data over the entire sample period (2010–2019).[18] This procedure results in 57 unique firms.

We collect audit and NAS fees, restatement indicators, and audit office information from individual client engagement observations in Audit Analytics. We obtain additional client-level financial information (e.g., client size) from COMPUSTAT. We require that audit offices have at least five public audit clients to ensure reasonable variation in the dependent variable at the metropolitan statistical area (MSA) level and allow for MSA fixed effects.[19] This procedure results in a final sample of 22,940 (2,252) client-level (office-year) observations from 4,135 unique clients audited by 321 unique audit offices. Our final sample covers 32 unique audit firms and includes the Big 4 firms (PwC, Deloitte, KPMG, and Ernst & Young) and 28 additional firms (e.g., Grant Thornton, BDO USA, RSM US, McGladrey, Moss Adams, CohnReznick, Baker Tilly, Crowe Horwath). Finally, we collect firm-level consulting revenues for our sample firms from the Accounting Today Top 100 Firms annual reports.

[18] The restriction to have at least100 employees in the Cognism resume data is motivated by the desire to increase the reliability of the data by reducing the influence of possible errors.

[19] The United States Office of Management and Budget (OMB) defines metropolitan statistical areas according to published standards that are used by the Census Bureau and other federal government agencies for statistical purposes.

Table 1 provides descriptive statistics of audit firms in our sample. On average, our comprehensive data cover 61,065 U.S.-based employees per year for Deloitte, 48,664 for PwC, 42,608 for EY, and 31,277 for KPMG. Our sample contains fifteen non-Big 4 firms with over 1,000 employees (the two largest non-Big 4 firms are RSM and Grant Thornton with 9,609 and 8,035 employees per year, respectively). We additionally validate the employee counts in the Cognism data against the firms' official U.S. employment numbers, as reported in Accounting Today Top 100 Firms annual reports and find that Cognism covers approximately 86% of public accounting employees. This excellent coverage adds external validity to our analyses. Additionally, we collect total revenues of audit firms and portions of total revenues attributable to Audit, Tax, and Consulting practices from the Accounting Today Top 100 Firms annual reports, reported in Columns 6, 7, 8, and 9, respectively, and observe that consulting employees and Consulting Revenues exhibit a correlation of 98%. This strong correlation suggests that the number of consulting employees serves as a good measure of the strength of the consulting arm of audit firms. Figure 1 displays the aggregated number of auditors and consultants employed in audit firms together with the aggregated revenues earned by audit and consulting practices over the 2010–2019 period. Consulting revenues and employment grew dramatically since 2010: by 2015, aggregate consulting revenues exceeded aggregate accounting revenues and by 2019 the consulting workforce became almost twice as large as auditing.

Table 2 Panel A presents descriptive statistics on demographic characteristics of employees in audit and consulting divisions. We compare employees' gender, age, education, and seniority levels. Consulting tends to have a higher share of male employees than audit (59% versus 53%). Consulting also tends to rely more on individual contributors and senior management, with a smaller middle level than auditing. In terms of age, consulting employees tend to be significantly

older, with only 43% of consulting employees below the age of 30, compared to 58% in audit. In terms of education, consulting employees are more likely to have MBAs (14% versus 5%) and doctorate degrees (2% versus 0.5%), and they are more likely to hold degrees from elite universities (8% versus 2%).

3.2 Audit and consulting employees: data on skills

An important feature of the Cognism data is that we observe not only individual employee's job functions, but also their skills and abilities. This allows us to dig deeper into potential knowledge sharing and identify which skills of consultants are more versus less helpful for auditors. We leverage the employees' self-reported skills in the Cognism data and draw on the methodology developed in Fedyk and Hodson (2020) for structuring these self-identified skills into organized skillsets. This approach uses topic modeling to classify hundreds of thousands of self-reported skills from individual resumes into 44 concrete skillsets ranging from *Legal* to *Product Management*.

We further group the skillsets into eight key areas of focus. The first is Accounting, which consists of the *Accounting & Audit* skillset. The second is Technical, which contains *Data Analysis*, *Information Technology*, and *Software Engineering* skillsets. The third is Management, which contains *Product Management, Administration, Middle Management, and Business Development* skillsets. The fourth is Human Resources, which includes the *Junior HR, Senior HR, Recruiting, and Personal Coaching* skillsets. The fifth area is Marketing, which covers the skillsets *Digital Marketing, Social Media, Video and Film Production, Graphic Design, Visual Design,* and *Musical Production.* The sixth is Operations, which consists of the skillsets *Operations Management, Product Management, Technical Product Management, Manufacturing Process Management, Industrial Management,* and *Construction Management*. The seventh area is

Research, which contains *Education* and *Public Policy* skillsets. The eighth area is Sales, covering *Sales, CRM and Sales Management, and Sales Management* skillsets. And the final area contains skillsets in specialized industries, including *Banking & Finance, Insurance, Construction, Healthcare, Pharmaceutical, Telecommunication, Energy, Oil & Gas,* etc. Using this classification, we assign one primary broad category skillset to each employee.

Table 2 Panel B presents the distributions of employee skills for audit and consulting employees. The most notable difference is that audit employees are far more likely to specialize in Accounting & Auditing. 72% of audit employees who report skills on their resumes have Accounting as their primary skill focus area, compared to only 23% of consulting employees. Instead, consulting employees are much more likely than audit employees to specialize in technical skills (7% vs. 1%), operations (23% vs. 2%), and have specific industry expertise (14% vs. 3%).

3.3 Audit and consulting employees: geographic locations

Cognism employment records contain city and country level locations for each individual, which we link to audit firms' offices. This is achieved in three steps. First, we use textual analysis techniques to correct common misspellings and standardize city names in the Congism location data. This step is necessary, because Cognism data is self-reported and presented in a non-standardized manner, which makes it prone to misspelling. Second, we use Python's "geopy" module and an open-source geocoding service "Nominatim" to transform each city in the Cognism data and each office location in the Audit Analytics data into a set of geographic coordinates. This step is crucial, because working in geographic distance allows us to map individuals to audit offices even when they live in suburbs with very different names. For example, no textual analysis technique would be able to identify that an individual living in Berkeley, California works in the San Francisco office — the city names have nothing in common. But after mapping both

coordinates into geographic coordinates, we can see that they are only 15 miles apart—within a close commuting range. In the final step of the process, we match the geographic coordinates of each audit firm employee to the firm's audit office with geographic coordinates that are the closest to that employee's. This procedure effectively assigns each audit and consulting employee to the closest audit office, based on their location.

4. Consulting services and audit quality

4.1 Consulting services and audit quality: main result

Our empirical analysis centers around the relationship between the consulting workforce available in an audit office and audit quality. Boardy, DeFond, and Zhang (2014) define audit quality as "greater assurance that the financial statements faithfully reflect the firm's underlying economics, conditioned on its financial reporting system and innate characteristics." Our main proxy for audit quality is the absence of misstatements in financial statements, because the propensity to restate financial statements is a robust and universally applicable indicator of low audit quality (Knechel et al. 2013; DeFond and Zhang 2014; Christensen et al. 2016; Aobdia 2019; Rajgopal et al. 2021).

Table 3 provides descriptive statistics of the audit clientele for our sample during 2010–2019. In terms of audit quality, on average, approximately 14% of issuers' financial statements experience future restatements (*Restatement*), approximately 4% experience material future restatements disclosed in Form 8-K item 4.02 (*Material Restatement*), and approximately 5% experience restatements related to revenue and accruals (*Revenue and accrual restatement*). SEC involvement in the restatement process is a very rare event, occurring in only 1% of cases (*SEC investigation*). Other audit office and client-level controls are in line with prior literature. In terms

of the workforce composition, on average, consulting employees represent 20% of the total workforce in an office of an audit firm.

We analyze the association between the probability of restatements ($I(RST_{i,t})$) and the share of consulting employees in the audit office's workforce ($Consulting_{i,t}$) using the following model:

$$I(RST_{i,t}) = \eta_0 + \eta_1 Consulting_{i,t} + c\ Controls_{i,t} + FE(industry, MSA, year) + \xi_{i,t} \quad (1)$$

The dependent variable, $I(RST_{i,t})$, is an indicator variable equal to one if the client has a misstatement in year *t* that is subsequently identified through a restatement in the Audit Analytics' Nonreliance Database, and zero otherwise. Our main variable of interest is the share of consulting employees at the audit office, relative to the total workforce of the office ($Consulting_{i,t}$), which measures the strength of the consulting branch of the office. We measure the prevalence of consulting employees at the office level in our main specification, because our interviews with audit partners reveal that much of the interaction between audit and consulting happens locally. Audit partners tend to reach out to consulting partners whom they know personally as the first step, and search for expertise at the firm level only if they do not have relevant local connections. In robustness analysis, we show that our results are robust to measuring the share of consulting employees at the firm level.

The control variables include the wide set of audit office and client characteristics that are shown by the prior literature to be associated with the likelihood of restatements (e.g., Dechow et al. 1996; Summers and Sweeney 1998; Kinney et al. 2004; Blankley et al. 2012; Cao et al. 2012; Lobo and Zhao 2013; DeFond and Zhang 2014; Aobdia 2019). On the office-level, we control for: whether the audit is issued by a Big 4 audit firm (*Big4*), whether the audit firm is an expert based on the MSA (metropolitan statistical area) market share of the audit office ($ExpertMSA_{i,t}$), office size measured by the number of clients served ($Clients_{i,t}$), and the importance a particular client

for a given office (*Importance*$_{i,t}$). Following Newton et al. (2013), we additionally control for competition faced by the audit office in its MSA (*Audit competition*$_{i,t}$), computed as the inverse of the Herfindahl index. Motivated by recent discussion in Beardsley el al. (2021) that the overall emphasis on providing NAS at the office-level might distract auditors from performing high quality audits, we control for the office-level NAS provision (*NAS_office*$_{i,t}$), measured as the sum of NAS fees from all public audit clients in the audit office in year *t*, excluding the current client, scaled by the total fees paid to the audit office in year *t*.

At the client-level, we control for firm characteristics that proxy for the complexity of the engagement and can affect the likelihood of restatements: size measured as the natural logarithm of total assets (*Size*$_{i,t}$), client age (*Age*$_{i,t}$), current ratio (*Current ratio*$_{i,t}$), return on assets (*ROA*$_{i,t}$), sales growth (*Sales growth*$_{i,t}$), leverage (*Leverage*$_{i,t}$), Altman's Z-score (*Z-score*$_{i,t}$), and the number of business segments (*Bussegments*$_{i,t}$). We control for the presence of merger and acquisition activity (*M&A*$_{i,t}$), discontinued operations (*Discontinued operations*$_{i,t}$), and foreign operations (*Foreign operations*$_{i,t}$). Additionally, we control for whether a client had an internal control weakness (*ICW*$_{i,t}$) in year *t*, was audited during the busy season in year *t* (*Busy season*$_{i,t}$), and was a first-time client for the audit firm in year *t* (*Auditor change*$_{i,t}$). To address the possibility of either client-specific knowledge spillover or independence issues discussed in the literature (Kinney et al. 2004, Paterson and Valencia 2011, Beardsley et al. 2019), we also control for client-specific NAS provision (*NAS_client*$_{i,t}$), computed as total NAS fees paid by the client to the audit firm in year *t* scaled by total fees paid by the client to the audit firm in year *t*. We include clients' industry fixed effects based on two-digit industry codes, year fixed effects, and audit office MSA fixed effects, which control for geographic effects such as proximity to the SEC office and availability of a skillful employee pool (Call et al. 2017, Beck et al. 2018). We winsorize all continuous control

variables at the 1st and 99th percentiles to reduce the impact of outliers, and we cluster standard errors at the issuer level. To facilitate the comparison and interpretation of the coefficient estimates, we standardize all continuous independent variables to have standard deviations equal to one. Appendix A provides detailed variable definitions.

Table 4 presents the results for four measures of the restatement variable $I(RST_{i,t})$. Column 1 looks at $I(Restatement_{i,t})$, an indicator variable equal to one if firm *i*'s financial statements for year *t* are restated. Column 2 considers $I(Material\ restatement_{i,t})$, an indicator variable equal to one if firm *i* reports a material restatement for year t, which is disclosed in Form 8-K item 4.02. Column 3 looks at $I(Revenue\ and\ accrual\ restatement_{i,t})$, an indicator variable equal to one if firm *i* reports a restatement for year *t* related to either revenue recognition or accruals. Column 4 considers $I(SEC\ investigation_{i,t})$, an indicator variable equal to one if there is SEC involvement in the restatement process, which occurs either if an SEC comment letter triggers the restatement or if there is an SEC inquiry into the circumstances surrounding the restatement.

The results indicate that the strength of the consulting arm in an audit office is positively associated with audit quality. We observe negative and statistically significant coefficients on $Consulting_{i,t}$ for all restatement variables and a negative but insignificant coefficient for SEC investigations (which have much lower power due to the rare nature of SEC events). These findings are robust to controlling for office characteristics, client-specific characteristics, and industry, MSA, and year fixed effects. Year fixed effects are important for removing broader time trends in restatements and focusing on cross-sectional differences in the strength of consulting practices in audit offices. MSA fixed effects allow us to control for the observable and unobservable geographic characteristics, such as access to a qualified workforce, which might affect the ability of audit firms to conduct high-quality audits (Call et al. 2017, Beck et al. 2018).

The estimated effects of the consulting workforce on audit quality are economically and statistically significant. For example, a one-standard-deviation increase in an audit firm's share of consulting employees over the course of the prior three years is associated with a 2.7 percentage point reduction in the likelihood of restatements, a 0.5 percentage point reduction in the likelihood of material restatements, and a 1.1 percentage point reduction in the likelihood of restatements related to accrual and revenue recognition. This is a sizable reduction: given that the average probability of restatements is 14%, a 2.7 percentage point reduction translates into a 19% relative decrease in the probability of restatements. The coefficient on SEC investigations is negative, but insignificant.

Overall, these results provide evidence consistent with the insights from our interviews that auditors' interactions with the consulting side of their firms are aimed at audit quality improvement, and the strength of the consulting arm at an audit office positively impacts audit quality.

The coefficient estimates on the control variables are consistent with the prior literature. A positive and significant coefficient on $NAS\_client_{i,t}$ suggests that a high share of NAS provision relative to overall services provided to a client impacts auditors' independence and negatively affects audit quality (Lisic et al. 2019, Donelson et al. 2020). Consistent with Beardsley el al. 2021, the coefficient estimate on $NAS\_office_{i,t}$ is positive, although it becomes statistically insignificant after the inclusion of $Consulting_{i,t}$.[20] The coefficient estimates on the control variables indicate that greater complexity of business activities and audit process is associated with a higher incidence of restatements (Schmidt 2012; Lisic et al. 2019; Beardsley et al. 2019). Additionally,

[20] We are able to replicate Beardsley el al. (2021) findings on the sample period from 2005 to 2015 without controlling for the strength of the consulting arm at the office level.

the presence of internal control weaknesses ($ICW_{i,t}$) increases the probability of subsequent restatements. A negative and significant coefficient estimate on $ExpertMSA_{i,t}$ suggests that clients of auditors who are local MSA experts experience less future restatements.

4.2 Consulting services and audit quality: robustness

We bolster our analysis of the effect of the consulting arm on audit restatements with several robustness tests. First, we document that the effects are consistent over time and do not diminish in recent years marked by the significant growth in the consulting services. Second, we show that the positive effects are present for both Big 4 and non-Big 4 firms. Third, we demonstrate that the positive effect of consulting on restatements is present at the firm level.

Accounting firms experienced significance growth in consulting services in the recent years, which prompted regulatory concerns (Donelson et al. 2020). To investigate whether the positive effect of consulting on audit quality persists in recent years despite the growth of consulting branches, we divide our sample into two subperiods, 2010-2014 and 2015-2019, and report estimation results for these subperiods in Table 5, Panel A. Our estimated effects are, if anything, slightly stronger in recent years than in earlier years. There is no detectible difference in the effect of consulting on total restatements in the two time periods: the coefficients on $Consulting_{i,t}$ are -0.025 and -0.024 (both significant) in 2010-2014 and 2015-2019, respectively. However, when we look at material restatements and restatements related to revenue and accruals, we observe some evidence that the positive effect of consulting on audit quality has increased over time. The coefficients on $Consulting_{i,t}$ are negative and significant in 2015-2019: -0.005 in column 4 (material restatements) and -0.011 in column 6 (revenue and accrual related restatements). The coefficients are negative but smaller and insignificant in 2010-2014: -0.003 in column 3 (material restatements) and -0.008 in column 5 (revenue and accrual related restatements). These findings

are consistent with the insights from the interviews that the involvement of consulting specialists in the audit process has grown over time. These findings also support of the knowledge sharing hypothesis: as the consulting practice grows, auditors get access to additional expertise.

Next, we consider whether our results reflect universal effects of consulting on audit quality or are driven by a small subset of firms—specifically, Big 4 firms, which, due to their size, importance, and business models, employ significant numbers of consulting workers. In Table 5 Panel B we estimate regression (1) separately for audits performed by Big 4 firms and non-Big 4 firms. Overall, the results are very consistent across the two subsamples. The magnitude of the reduction in total restatements from consulting is similar for offices of Big 4 and non-Big 4 firms. For material restatements, the coefficient on $Consulting_{i,t}$ is positive but insignificant for offices of Big 4 firms and positive and significant for offices of non-Big 4 firms. On the flip side, the reduction in revenue and accrual related restatements is slightly higher among non-Big 4 firms (although the difference is not statistically significant).

Finally, we repeat our main analysis at the firm level. Interviews with audit partners reveal that in cases where required expertise goes beyond specialized knowledge possessed by consultants in a given office, auditors seek recommendations at the national level and contact specialists located in different parts of the country. Therefore, we expect our office-level results to also hold at the firm level. Table 5 Panel C reports the results for regression (1) with the main explanatory variable, $Consulting_{i,t,}$ calculated at the firm level—as the share of consulting employees in the audit firm's total workforce. Negative and statistically significant coefficients on $Consulting_{i,t}$ in all specifications, with the exception of SEC investigation, indicate that the probability of restatements declines with the strength of the consulting arm in the firm. The estimated effects are also economically significant. A one-standard-deviation increase in an audit

firm's share of consulting employees is associated with a 3.3 percentage point reduction in the likelihood of restatements, a 0.4 percentage point reduction in the likelihood of material restatements, and a 1.4 percentage point reduction in the likelihood of restatements related to accrual and revenue recognition. These results are consistent with the insights from interviews with audit partners that there are extensive knowledge sharing channels between consulting employees and auditors at both office and firm levels.

4.3 Cross-sectional analyses

To provide further support for our empirical results, we conduct several additional analyses that show that our main effects are stronger in audits where one would ex ante expect expertise and knowledge sharing from consulting to play a greater role. Building on the insights from our interviews with audit partners, we expect consulting to make a greater contribution to audit quality in more complex audits. All of our interviewees indicated that they are more likely to get consultants involved in the audit process in complex situations and when the audits involve special subject matter. We empirically estimate the following regression:

$$I(RST_{i,t}) = \eta_0 + \eta_1 Consulting_{i,t} + \eta_2 Consulting_{i,t} \times Complexity_{i,t} + c\, Controls_{i,t} + FE(industry, MSA, year) + \theta_{i,t} \quad (2)$$

The dependent variable $I(RST_{i,t})$ is an indicator variable equal to one if the client has a misstatement in year *t* that was subsequently identified through a restatement. The main variable of interest is the interaction term between the share of consulting employees in the office ($Consulting_{i,t}$) and proxies of audit complexity ($Complexity_{i,t}$).

Table 6 reports the estimation results for four proxies of complexity: (i) client size ($Size_{i,t}$) in Column 1, (ii) the client's importance for the audit office ($Importance_{i,t}$)[21] in Column 2, (iii) presence of foreign operations ($Foreign\ Operations_{i,t}$) in Column 3, and (iv) the number of business segments reported by the client ($Bussegments_{i,t}$) in Column 4. The control variables are the same as in regression (1). All proxies for complexity are included in control variables. The positive and significant coefficients on $Foreign\ Operations_{i,t}$ (0.024) and $Bussegments_{i,t}$ (0.011) show that, in general, clients with more business segments and foreign operations are more difficult to audit. Consistent with our expectations and insights from the interviews, the challenge faced by auditors during complex audits is partially mitigated by the presence of a strong consulting arm. This is supported by negative and statistically significant coefficients on interaction terms $Consulting_{i,t}*Size_{i,t}$ (-0.020), $Consulting_{i,t}*Importance_{i,t}$ (-0.015), $Consulting_{i,t}*Foreign\ Operations_{i,t}$ (-0.010), and $Consulting_{i,t}*Bussegments_{i,t}$ (-0.011), in columns (1), (2), (3), and (4), respectively.

4.4 Complementarity of skills and expertise sharing

Having established our core result of a positive association between the consulting workforce and audit quality, our second objective is to empirically disentangle which skills of consulting employees bring the most value to audit work. All of our interviewees pointed out that wider and richer skillsets in consulting help address special complex situations such as fair value accounting, assets impairment, business combinations, and IT controls. While auditors have a general skillset to assess these issues, they need to rely on specialists with in-depth experience and subject matter expertise in more difficult situations. When asked what is regarded as the most

[21] While a client's size and importance for the audit office are correlated, the correlation is only 32%, because these two variables capture distinct features. Client size measures the overall complexity of the client's business operations. A client's importance for the audit office measures the proportion of the revenues that the office derives from the client and serves as a proxy for both complexity and auditor's risk.

valuable skills of consulting employees, all of our interviewees said that they look for skills that are complementary to their own and pointed to two most valuable skills: valuation that requires industry-specific expertise and technology (IT) expertise. Other skills mentioned by audit partners as especially valuable include management and organizational skills, technical accounting, and internal control specialists.

In this subsection, we empirically test these interview insights using our unique data on employee skills. First, we estimate how the complementarity of skills between auditors and consulting employees from the same office affects audit quality in that office. Second, we investigate which specific skills of consulting employees contribute the most to audit quality.

To start, we divide audit offices into two groups: (1) offices where auditors' and consultants' skillsets are distinct and (2) offices where the skillsets are similar. Our hypothesis is that consulting employees will have a greater positive effect on audit quality in the first set of offices, where consulting employees bring a distinct set of skills complementary to the skills that are already possessed by the audit team. We define the offices with distinct skillsets as those where skills' distributions are significantly different between audit and consulting employees with a p-value of the Chi-square test less than or equal to 10%. Offices with the similar skillsets are those where the p-value of the Chi-square test is greater than 10% (i.e., no significant difference between the skill distributions of auditors and consultants). We estimate regression (1) on these two subsamples and report the results in Table 7 Panel A. Consistent with complementary skills bringing new expertise and contributing to helpful knowledge sharing, we find that the presence of a strong consulting arm is especially beneficial for audit quality is especially beneficial for audit quality in the offices where audit and consulting employees have distinct skillsets. By contrast, in the offices where auditing and consulting employees have similar skillsets, the impact of

consulting personnel is minimal. In particular, the coefficient on $Consulting_{i,t}$ is negative and statistically significant (-0.034) for the sample of offices with distinct skillsets (Column 1) and negative but statistically insignificant (-0.007) for the subsample of offices with similar skillsets (Column 2).

Next, to test which specific skills in the consulting workforce are most impactful for audit quality, we dig into each of the five most common skillsets (as reported in Table 2 Panel B): *Specific Industry*, *Technical*, *Management*, *Accounting*, and *Operations* skillsets. For each of these skillsets, we divide audit offices into "high" and "low" groups based on the percentage of consulting employees with that skillset. If the proportion of consulting employees with a certain primary skillset in an office is above the median in year *t* we classify the office into the "high" group, and if the proportion is below the median we classify the office into the "low" group.

The results are reported in Table 7 Panel B. We find that consulting contributes most to audit quality when the consultants in a given office have more *Specific Industry* skills, *Technical* skills, and *Management* skills. Specifically, a one-standard-deviation increase in the share of consulting employees in an office reduces the probability of a restatement by 3.5 percentage points if the office has a "high" share of consultants with *Specific Industry* skills and by only 0.7 percentage points in offices with a "low" share. This difference is statistically significant at the 1% level. Similarly, a one-standard-deviation increase in consulting employees reduces the probability of restatements by 3.7 and 1.1 percentage points, respectively, in offices with "high" versus "low" shares of *Technical* skills among consulting employees. This difference is statistically significant at the 10% level. Finally, a one-standard-deviation increase in consulting employees reduces the probability of restatements by 3.1 and 1.0 percentage points, respectively, in offices with "high" versus "low" presence of *Management* skills among the consultants. This difference is statistically

significant at the 5% level. We do not find any statistical difference between the contribution of consulting employees in offices with "high" versus "low" percentages of consultants with *Operations* skills.

Finally, in the offices with high shares of consulting employees with *Accounting Skills*—i.e., in offices where consulting employees share similar skills with auditors—we observe a lower impact of consulting on audit quality. Specifically, a one-standard-deviation increase in the share of consulting employees decreases the probability of a misstatement by 2.0 percentage points in offices with "high" shares of *Accounting* skills among consulting employees, compared to 3.5 percentage points in offices with "low" shares of *Accounting* skills among consulting employees (this difference is statistically significant at the 5% level). Overall, results from Table 7 point to the importance of complementarity in skills among auditing and consulting employees for audit quality, confirming the insights from our interviews that sharing of specialized expertise is at the crux of consulting employees' contribution to the audit process.

4.5 Additional analyses: office size and employees' firm tenure

To bolster our analysis and better understand the mechanism behind consulting employees' contribution to audit quality, we conduct two additional tests examining the effects of: (i) office size and (ii) employees' firm tenure for both consulting and audit employees.

First, we investigate the impact of office size on the synergy between audit and consulting practices. From our interviews, we learn that when auditors need advice from the consulting practice, they first address their questions to consulting partners in their own office, due to familiarity and trust. Thus, we expect the impact of the consulting arm on audit quality to be stronger in larger offices, where auditors are more likely to have a wider variety of familiar

specialists to consult. To study the office size effect, we divide audit offices into terciles based on the number of employees and estimate regression (1) separately in each tercile.

The results reported in Table 8 support our predictions The impact of consulting on audit quality is positive and statistically significant in mid-size and large offices (in the middle and highest terciles). However, we do not find a significant effect of consulting employees on the probability of misstatements in small offices (the lowest tercile). Specifically, a one-standard-deviation increase in the share of consulting employees in a particular office reduces the probability of restatements by 4.6 percentage points among the clients of mid-size offices, by 3.1 percentage points among the clients of large offices, and has no effect on the probability of restatements for clients of small offices. The differences between the lowest and the medium terciles and the lowest and the highest terciles are significantly different at the 5% and 10% levels, respectively.

Next, we study the effect of consulting and audit employees' firm tenure on audit quality by analyzing the association between the probability of restatements ($I(RST_{i,t})$) and the interaction between the share of consulting employees in the total office workforce ($Consulting_{i,t}$) and consulting and audit employees' average firm tenure. We estimate the following model:

$$\begin{aligned} I(RST_{i,t}) = \ & \eta_0 + \mu_1 Consulting_{i,t} + \mu_2 ConsEmpFirmTenure_{i,t} \\ & + \mu_3 Consulting_{i,t} \times ConsEmpFirmTenure_{i,t} \\ & + \mu_4 AuditEmpFirmTenure_{i,t} \\ & + \mu_5 Consulting_{i,t} \times AuditEmpFirmTenure_{i,t} + c\ Controls_{i,t} \\ & + FE(industry, MSA, year) + \vartheta_{i,t} \end{aligned} \quad (3)$$

Where the dependent variable $I(RST_{i,t})$ is an indicator variable equal to one if the client has a misstatement in year *t* that is subsequently identified through a restatement. The main variables of

interest are $ConsEmpFirmTenure_{i,t}$ and $AuditEmpFirmTenure_{i,t}$ and their interaction terms with the share of consulting employees in the office ($Consulting_{i,t}$). $ConsEmpFirmTenure_{i,t}$ and $AuditEmpFirmTenure_{i,t}$ are defined as the average number of years of employment at the firm for consulting and audit employees of the audit office, respectively. As employee firm tenure is a proxy for employee experience, we expect that more experienced consulting employees contribute more expertise to audit quality, and thus we expect a negative coefficient on $Consulting_{i,t}$ x $ConsEmpFirmTenure_{i,t}$. With respect to auditors' firm tenure, we expect that more experienced auditors have more long-standing internal work processes and are less likely to seek external help from the consulting division. Thus, we expect that the effect of consulting employees on audit quality diminishes with the increase in auditors' own firm tenure and anticipate a positive coefficient on $Consulting_{i,t}$ x $AuditEmpFirmTenure_{i,t}$.

The results of regression (4) are reported in Table 9. In Column 1, we estimate regression (4) only for the effect of consulting employees' firm tenure. We find that the coefficient estimate on $ConsEmpFirmTenure_{i,t}$ is insignificantly different from zero, while the coefficient on $Consulting_{i,t}$ x $ConsEmpFirmTenure_{i,t}$ is negative (-0.005) and statistically significant. These results demonstrate that more experienced consulting employees contribute more to audit quality. In Column 2, we study the effect of audit employees' firm tenure. The coefficient estimate on $AuditEmpFirmTenure_{i,t}$ is insignificantly different from zero, while the coefficient on $Consulting_{i,t}$ x $AuditEmpFirmTenure_{i,t}$ is positive (0.011) and statistically significant. This result is consistent with more experienced audit employees being less likely to seek help from the consulting arm, making the effect of consulting diminish with auditor experience. In Column 3, we combine the analysis of both consulting and audit employees' firm tenure and find that the results remain similar to those reported in Columns 1 and 2. In particular, the coefficients on

ConsEmpFirmTenure$_{i,t}$ and *AuditEmpFirmTenure*$_{i,t}$ are insignificant. The coefficients on *Consulting*$_{i,t}$ x *AuditEmpFirmTenure*$_{i,t}$ and *Consulting*$_{i,t}$ x *AuditEmpFirmTenure*$_{i,t}$, are statistically significant at -0.006 and 0.012, respectively. Overall, consulting employees' experience positively affects audit quality. However, the positive effect of consulting diminishes with auditors' own experience. These results are especially interesting, given that the best of our knowledge, this is the first large-scale study of audit and consulting employees' experience (proxied by employees' tenure with the firm) and its relationship to audit quality.

4.6 Additional analyses: alternative proxies for audit quality

In our main analysis, we follow the prior literature and use restatements as the main proxy for audit quality (DeFond and Zhang 2014, Christensen et al. 2016, Aobdia 2019, Lisic et al. 2019, Donelson et al. 2020). Aobdia (2019) points out the need for audit studies to use more than one proxy of audit quality to limit type I errors and highlights the three measures of audit quality used by academics that have significant associations with measures of audit process deficiencies used by auditors and regulators (PCAOB): (i) the propensity to restate financial statements, (ii) the propensity to meet or beat earnings threshold, and (iii) audit fees. Aobdia (2019) also demonstrates that absolute total and discretionary accruals are predictive of PCAOB deficiencies but are not predictive of internal inspection deficiencies. We consider all of these suggested alternative audit quality proxies for robustness.

We re-estimate equation (1) and report the results in Table 10 using audit fees (Column 1), the propensity to meet or beat analysts' forecasts by one cent (Column 2), absolute total accruals (Column 3), and absolute discretionary accruals (Column 4), as alternative dependent variables. *Audit fee*s are the natural logarithm of audit fees reported in Audit Analytics. *Propensity to meet or beat analysts' earnings forecasts* is an indicator variable for whether a firm's EPS minus the

consensus analysts' forecast is between zero and one cent (inclusive). Appendix A provides a detailed description of how *absolute total* and *absolute discretionary accruals* are computed. The two main alternative proxies for audit quality (Aobdia 2019)—audit fees and the propensity to barely meet earnings thresholds—provide robust supporting evidence that consulting employees are positively associated with audit quality. Specifically, the positive and statistically significant coefficient (0.026) in Column 1 indicates that audit fees increase with the strength of the consulting arm in the office. The negative and significant coefficient (-0.06) on $Consulting_{i,t}$ in Column 2 confirms that stronger consulting practices are associated with a reduced propensity to meet or beat analysts' forecasts by one cent. We also find a negative, though insignificant, correlation between the share of consulting employees and absolute total and discretionary accruals (Columns 3 and 4).[22]

Overall, we demonstrate that consulting employees positively affect audit quality for all three significant measures of audit quality identified by the prior literature (Aobdia 2019): propensity to restate financial statements, audit fees, and the propensity to meet or beat analysts' earnings forecasts. These results provide additional support for our findings that higher presence of consulting employees is associated with better audit quality.

5. Conclusion

In this paper, we explore the extent to which human capital in consulting divisions of accounting firms helps improve the quality of the audit process. Accounting firms' annual quality reports and in-depth interviews with audit partners both suggest the potential for consulting

[22] We also re-estimate equation (1) using absolute performance-matched discretionary accruals (Kothari et al. 2005, Reichelt and Wang 2010). Similar to the results reported for absolute total and discretionary accruals, the coefficient on absolute performance-matched discretionary accruals is negative but insignificant.

employees to benefit the audit process. In-house consulting employees offer specialized expertise, including technical expertise and industry-specific expertise, that can help improve specific parts of the audit process. In fact, auditors report involving their consulting colleagues in 60--80% of their audit engagements. The main contribution of our paper is to empirically document that higher presence of consulting employees is indeed associated with better audit quality.

Our empirical analysis leverages a unique dataset that covers 86% of all employees of large U.S. public accounting firms, together with these employees' detailed job information, background, demographics, and skills. Thus, we are able to observe whether each employee works in audit or consulting, and what skills that employee possesses. We find a positive effect of consulting employees on audit quality: a one-standard-deviation increase in the percentage of consulting employees in an office, results in a 2.7 percentage point reduction in restatements in that office. This result reflects knowledge sharing between consulting and audit practices: the effect is strongest when consulting employees have skills complimentary to auditors, including special industry skills, technical skills. and management skills. Our findings contribute an important new angle to the ongoing debate around the composition of accounting firms: whether housing auditing and consulting practices in the same firms leads to conflicts of interest or offers synergies. We hope that our work can open new avenues of research on the granular relationships between audit and consulting practices.

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Appendix A: Variable definitions

Measures of audit quality

Restatement	An indicator variable that is equal to one if a firm reports a restatement in the future, and zero otherwise.
Material restatement	An indicator variable that is equal to one if a firm reports a material restatement disclosed in Form 8-K item 4.02 filing (Audit Analytics: DATE_OF_8K_402) in the future, and zero otherwise.
Revenue accrual Restatement	An indicator variable that is equal to one if a firm reports a restatement related to either revenue recognition or accruals issues in the future, and zero otherwise.
SEC investigation	An indicator variable that equals one if there is SEC involvement in the restatement process. The involvement can take the form of either an SEC comment letter that triggered the restatement or a formal or informal SEC inquiry into the circumstances surrounding the restatement.
Total accruals	Is calculated as (Change ACT – change CHE – change LCT + change DLC – DP)/AT *t-1*
Absolute total accruals	In an absolute value of total accruals
Discretionary accruals	is a residual of accruals from cross-sectional modified Jones model (Dechow et al. 1995, Kothari et al. 2005, Reichelt and Wang 2010) $$TCA_{i,t} = \beta_0 + \beta_1 CFO_{i,t-1} + \beta_2 CFO_{i,t} + \beta_3 CFO_{i,t+1} + \beta_4 \Delta Sales_{i,t} + \beta_5 PPE_{i,t} + \epsilon_{i,t}$$
Absolute discretionary accruals	Is an absolute value of the discretionary accruals
Audit fees	The natural logarithm of audit fees reported in Audit Analytics.
Meet or beat analysts' earnings forecasts	An indicator variable that is equal to one if a firm's EPS minus the consensus analysts' forecast is within zero to one cent (both inclusive), and zero otherwise.

Measures of consulting employees and their skills

Consulting	Number of consulting employees in the audit firm's office in year *t* scaled by the total workforce in that office.
Accounting skills	Number of consulting employees with primary accounting skills in audit firm's office in year *t* scaled by the total consulting workforce in that office (for more details on specific skills see section 3.2).
Technical skills	Number of consulting employees with primary skills in data analysis, software engineering, and IT management support the audit firm's office in year *t* scaled by the total consulting workforce in that office (for more details on specific skills see section 3.2).
Operations skills	Number of consulting employees with primary operations skills in audit firm's office in year *t* scaled by the total consulting workforce in that office (for more details on specific skills see section 3.2).
Management skills	Number of consulting employees with primary management skills in audit firm's office in year *t* scaled by the total consulting workforce in that office (for more details on specific skills see section 3.2).
Human resource skills	Number of consulting employees with primary human resource skills in audit firm's office in year *t* scaled by the total consulting workforce in that office (for more details on specific skills see section 3.2).
Marketing skills	Number of consulting employees with primary marketing skills in audit firm's office in year *t* scaled by the total consulting workforce in that office (for more details on specific skills see section 3.2).

Research skills	Number of consulting employees with primary research skills in audit firm's office in year *t* scaled by the total consulting workforce in that office (for more details on specific skills see section 3.2).
Sales skills	Number of consulting employees with primary sales skills in audit firm's office in year *t* scaled by the total consulting workforce in that office (for more details on specific skills see section 3.2).
Specific Industry skills	Number of consulting employees with primary specialization in certain industry skills in audit firm's office in year *t* scaled by the total consulting workforce in that office (for more details on specific skills see section 3.2).
ConsEmpFirmTenure	Average number of years of employment at the firm for consulting employees of an audit office in year *t*.
AuditEmpFirmTenure	Average number of years of employment at the firm for audit employees of an audit office in year *t*.

Controls: Audit office level

NAS_office	NAS fees to all audit clients in the audit firm's office in year *t*, excluding NAS fees provided to the client, scaled by total fees paid to the audit office in year *t*.
Audit competition	Audit completion in the audit firm office's MSA in year *t*, computed as the inverse of the Herfindahl index following Newton et al. (2013).
Clients	Natural logarithm of the number of public clients audited by the audit office in year *t*.
ExpertMSA	Indicator variable equal to one when the audit firm office receives over thirty percent of all audit fees from public clients for the local MSA in year *t*, and zero otherwise (Beardsley et al. 2021).
Big4	Indicator variable that is equal to one if an auditor is PwC, KPMG, Ernst & Young, or Deloitte, and zero otherwise.

Controls: Client level

NAS_client	Total NAS fees paid by the client to the auditor in year *t* scaled by total fees paid by the client to the auditor in year *t*.
Importance	Client audit fees in year *t* scaled by the audit fees for the entire audit office in year *t*.
Size	Natural log of total assets.
Age	Natural logarithm of the age of the client in year *t*. Age is the number of years since the first time the client appears in the Compustat database.
Current ratio	Current assets scaled by current liabilities (ACT/ LCT).
ROA	Net income scaled by average total assets (NI*2/(AT + AT t-1)).
Leverage	Long-term debt (including long-term debt in current liabilities) scaled by average total assets (DLC+ DLTT)*2/(AT + AT t-1).
Z-score	Z-score of the client in year *t*, where Z-score is equal to -4.3-(4.5*(net income/total assets))+(5.7*(total liabilities/total assets))-(0.004*(current assets/current liabilities)).
Bussegments	Number of business segments.
Sales growth	One-year percentage growth in sales (SALE – SALE t-1)/SALE t-1.
M&A	Indicator variable equal to one when the client has merger or acquisition activity in year *t* (Compustat AQP is non-zero), and zero otherwise.
Discontinued operations	Indicator variable equal to one when the client has discontinued operations in year *t* (Compustat DO or XI is non-zero), and zero otherwise.
Foreign operations	Indicator variable equal to one when the client has foreign operations in year *t* (Compustat PIFO is non-zero), and zero otherwise.
ICW	Indicator variable equal to one if the client has an internal control weakness in year

	t, zero otherwise. We use Audit Analytics' SOX 404 Internal Controls database for internal control weaknesses identification.
Busy season	Indicator variable equal to one when the client is audited during the busy season in year *t*, zero otherwise. A busy season audit is an audit of a client with December fiscal year-end.
Auditor change	Indicator variable equal to one when the client audited by the audit firm for the first time in year t, zero otherwise.

FIGURE 1

Aggregate firm-level audit and consulting revenues and employment from 2010 to 2019

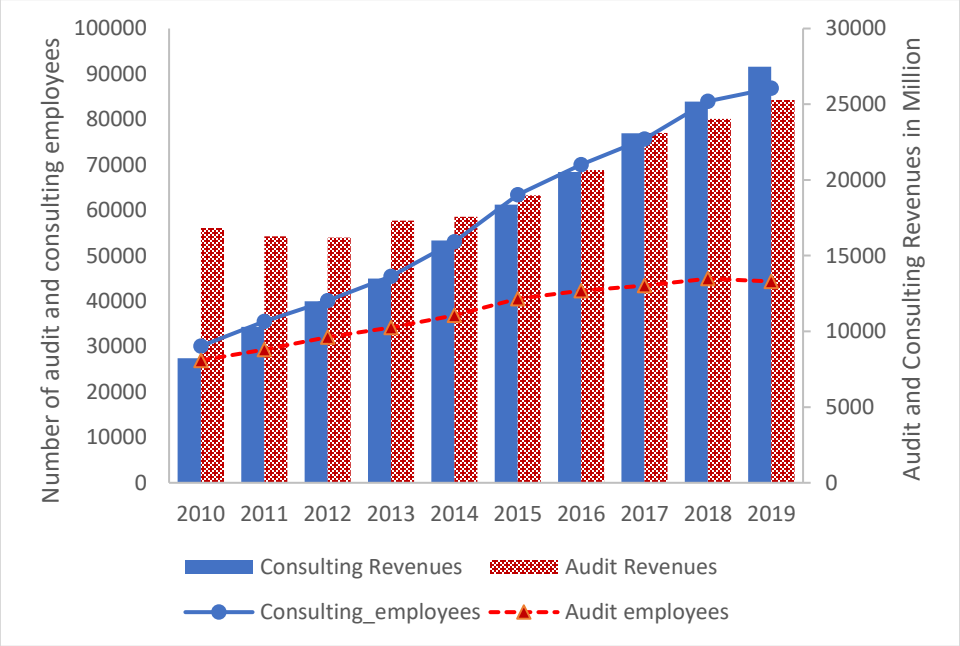

TABLE 1
Audit Firms: Descriptive Statistics

This table provides descriptive statistics of audit firms in our sample during 2010-2019 period. Columns 1-4 report the average total number of employees of audit firms and their audit, tax, and consulting practices, respectively. Column 5 shows the average number of "other" employees, which encompasses human resource, IT and administrative support, and all other unclassified employees. Columns 6-9 report the average total revenue of audit firms and their audit, tax, and consulting practices, respectively, over 2010-2019 period from *Accounting Today*.

Auditor name	**Average number of employees**	**Average number of audit employees**	**Average number of tax employees**	**Average number of consulting employees**	**Average number of "other" employees**	**Average total revenue**	**Average audit revenue**	**Average tax revenue**	**Average consulting revenue**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Deloitte	61065	9497	6946	22329	22294	14758	4570	2752	6821
PWC	48664	4984	9193	9036	25452	11470	5072	3111	3176
EY	42608	4717	7722	12484	17685	9981	3568	2962	2753
KPMG	31277	8466	5622	6889	10300	6903	2523	1879	2501
RSM US	9609	1078	2554	1786	4191	1702	677	611	397
Grant Thornton	8035	2386	1743	1419	2488	1417	572	386	459
BDO USA	5851	1323	1710	518	2299	913	495	286	132
CBIZ & MHM	3466	398	691	496	1881	628	187	190	251
Moss Adams	2568	317	801	259	1191	441	200	160	80
CohnReznick	2531	631	736	247	916	533	286	156	41
Plante Moran	2449	286	711	448	1004	409	172	114	122
BKD	2437	554	527	439	917	464	228	143	93
Crowe	2064	459	416	426	763	675	244	162	243
Dixon Hughes Goodman	1869	268	446	398	757	319	113	107	100
All other average	750	144	193	94	319	130	53	50	21

TABLE 2
Consulting and audit workforce characteristics

This table reports workforce characteristics of audit and consulting practices of audit firms. Panel A presents demographic characteristics, while Panel B displays the distribution of skills in audit and consulting practices. Skills are defined in Appendix A. *** indicates that the means are statistically different at less than 1% level of significance.

Panel A: Employees' demographic characteristics

	Auditing	Consulting	Difference
Gender			
Male	53.14%	59.36%	-6.22%***
Female	46.86%	40.64%	6.22%***
Seniority			
Individual contributor	67.08%	77.86%	-10.78%***
Middle management	26.32%	13.55%	12.78%***
Senior level	11.38%	15.67%	-4.29%***
Age			
21-25	24.94%	17.31%	7.63%***
26-30	33.37%	25.61%	7.75%***
31-35	22.93%	22.50%	0.42%
36-40	9.40%	14.78%	-5.37%***
41-45	3.85%	8.00%	-4.15%***
46-50	1.82%	4.71%	-2.90%***
51-55	0.83%	2.74%	-1.91%***
56-60	0.43%	1.44%	-1.01%***
61-65	0.20%	0.65%	-0.45%***
66+	0.16%	0.59%	-0.43%***
Education level			
Bachelors	60.30%	57.22%	3.08%**
Masters (not MBA)	26.25%	16.04%	10.21%***
Masters (MBA)	5.15%	14.16%	-9.02%***
Doctorate (J.D., Ph.D., etc.)	0.48%	1.99%	-1.50%***
Unknown (not self-reported)	7.43%	9.88%	-2.45%***
Elite universities	1.90%	8.14%	-6.24%***
Tenure	3.53	4.46	-0.93***

Panel B: Distribution of employees' primary skills

Skills	Auditing	Consulting	Difference
Accounting	72.13%	22.80%	49.33%***
Technical	1.48%	9.49%	-8.01%***
Management	17.29%	17.58%	-0.29%
Human resource	2.75%	5.96%	-3.21%***
Marketing	0.76%	2.15%	-1.38%***
Operations	1.62%	22.56%	-20.94%***
Research	0.18%	1.22%	-1.04%***
Sales	0.36%	2.79%	-2.43%***
Specific Industry Skills	2.74%	13.65%	-10.91%***

TABLE 3
Descriptive Statistics

This table reports descriptive statistics of audit clients and offices. All variables are defined in Appendix A.

Variable	N	Mean	Std Dev	25th Pctl	50th Pctl	75th Pctl
Dependent variables						
Restatement	22940	0.14	0.35	0	0	0
Material restatement	22940	0.04	0.19	0	0	0
Revenue and accruals related restatement	22940	0.05	0.22	0	0	0
SEC investigation	22940	0.01	0.08	0	0	0
Independent variables - office level						
Consulting	22940	0.20	0.10	0.13	0.19	0.27
NAS_office	22940	0.19	0.05	0.16	0.19	0.22
Audit competition	22940	4.06	1.14	3.37	4.04	4.57
ExpertMSA	22940	0.00	0.05	0	0	0
Clients	22940	24.39	17.42	11	18	34
Big 4	22940	0.80	0.40	1	1	1
Independent variables - client level						
NAS_client	22940	0.13	0.14	0.02	0.10	0.21
Importance	22940	0.02	0.03	0.00	0.01	0.02
Size	22940	6.79	2.15	5.41	6.88	8.27
Age	22940	23.56	17.59	10	19	31
Current ratio	22940	2.70	3.06	1.21	1.88	3.03
ROA	22940	-0.06	0.42	-0.05	0.03	0.07
Leverage	22940	0.29	0.32	0.05	0.24	0.41
Z_score	22940	-0.74	29.72	-2.25	-1.14	-0.09
Numbusseg	22940	2.34	1.86	1	1	3
Sales growth	22940	0.18	0.79	-0.03	0.06	0.18
M&A	22940	0.35	0.48	0	0	1
Discontinued operations	22940	0.15	0.36	0	0	0
Foreign operations	22940	0.55	0.50	0	1	1
ICW	22940	0.04	0.19	0	0	0
Busy season	22940	0.76	0.43	1	1	1
Auditor change	22940	0.04	0.20	0	0	0

TABLE 4
Restatements and consulting

This table reports results from the regression of the likelihood of restatements on the share of consulting employees in the audit office ($Consulting_{i,t}$). The dependent variables are *Restatement*, *Material restatement*, *Revenue and accrual restatement*, and *SEC investigation* in columns 1, 2, 3, and 4, respectively. All variables are defined in Appendix A. We winsorize all continuous control variables at the 1 and 99 percentiles and standardize them to have standard deviations equal to one. The OLS regression is estimated with issuer's industry, office's MSA, and year fixed affects. Standard errors are clustered by issuer. ***,**,* signify statistical significance at the 1%, 5%, and 10% levels of significance, respectively.

VARIABLES	(1) **All Restatements**	(2) **Material Restatements**	(3) **Revenue and Accruals Related Restatements**	(4) **SEC Investigations**
Consulting	-0.027***	-0.005*	-0.011***	-0.001
	(-5.412)	(-1.785)	(-3.304)	(-0.509)
NAS_office	0.002	0.000	-0.004	0.000
	(0.416)	(0.061)	(-1.279)	(0.222)
NAS_client	0.006*	0.003*	0.004*	0.000
	(1.846)	(1.831)	(1.735)	(0.464)
Big4	0.033**	-0.019**	0.021**	-0.001
	(2.361)	(-2.148)	(2.236)	(-0.263)
Importance	0.005	0.003	0.001	0.000
	(0.858)	(1.171)	(0.374)	(0.307)
Audit_competition	0.012	0.008	0.008	0.001
	(1.183)	(1.357)	(1.223)	(0.217)
ExpertMSA	-0.150**	-0.032	-0.069	-0.024
	(-2.426)	(-1.168)	(-1.639)	(-1.324)
Clients	-0.006	0.002	-0.005	-0.001
	(-0.939)	(0.623)	(-1.213)	(-0.695)
Size	-0.000	-0.005	0.001	0.003
	(-0.040)	(-1.262)	(0.168)	(1.641)
Age	-0.014***	-0.004*	-0.002	-0.000
	(-3.153)	(-1.758)	(-0.679)	(-0.396)
Current_ratio	-0.009***	-0.004**	-0.006***	-0.002***
	(-2.956)	(-2.259)	(-3.665)	(-3.367)
ROA	0.003	0.001	0.007***	0.002*
	(0.776)	(0.277)	(3.700)	(1.887)
Leverage	0.008**	0.003	0.004*	0.001
	(2.158)	(1.618)	(1.838)	(1.149)
Zscore	0.000	0.000	0.001	0.000
	(0.104)	(0.298)	(0.842)	(0.715)
Bussegments	0.008**	0.000	-0.000	-0.001*
	(1.979)	(0.191)	(-0.173)	(-1.729)
Sales_growth	0.002	0.002	0.002	0.000
	(0.754)	(1.505)	(1.133)	(0.588)
M&A	0.021***	0.011***	0.010**	-0.001
	(3.099)	(2.999)	(2.149)	(-0.411)
Discontin_oper	0.019*	0.004	0.004	-0.002
	(1.929)	(0.765)	(0.578)	(-0.838)
Foreign	0.019**	-0.007	0.002	-0.001

	(2.227)	(-1.269)	(0.299)	(-0.742)
ICW	0.262***	0.173***	0.137***	0.032***
	(14.539)	(11.867)	(9.582)	(4.756)
Busy_season	-0.017*	-0.004	-0.011	0.001
	(-1.775)	(-0.722)	(-1.642)	(0.617)
Auditor_change	0.063***	0.048***	0.031***	0.006
	(4.722)	(5.112)	(3.295)	(1.389)
Constant	0.097***	0.047***	0.031***	0.007
	(6.433)	(4.968)	(3.194)	(1.639)
Observations	22,940	22,940	22,940	22,940
R-squared	0.068	0.058	0.041	0.026
Year, Industry, MSA FE	YES	YES	YES	YES

TABLE 5
Robustness results

This table reports the results of robustness tests of the regression of the likelihood of restatements on the share of consulting employees in the audit office (*Consulting*$_{i,t}$). Panel A shows the estimation results for two sub-periods: columns 1, 2, 3, and 4 are for the 2010-2015 period, while 5, 6, 7, and 8 are for 2016-2019 period. The dependent variables are *Restatement*, *Material restatement*, *Revenue and accrual restatement*, and *SEC investigation* in columns 1 and 2, 3 and 4, and 5 and 6, respectively. Panel B reports the results for Big 4 and non-Big 4 firms separately. The dependent variables are *Restatement*, *Material restatement*, *Revenue and accrual restatement*, and *SEC investigation* in columns 1, 2, 3, and 4, respectively. Panel C reports the regression results of the likelihood of restatements on the share of consulting employees in the audit firm (*Consulting_firm*$_{i,t}$), defined as a number of consulting employees in an audit firm in year *t* scaled by the total workforce in that firm. The dependent variable is *Restatement*, *Material restatement*, *Revenue and Accrual related restatement*, and *SEC investigation* in columns 1, 2, 3, and 4, respectively. All variables are defined in Appendix A. We winsorize all continuous control variables at the 1 and 99 percentiles and standardize them to have standard deviations equal to one. The OLS regression is estimated with issuer's industry, office's MSA, and year fixed affects. Standard errors are clustered by issuer. ***,**,* signify statistical significance at the 1%, 5%, and 10% levels of significance, respectively.

Panel A: Different Time Periods: (2010-2014) versus (2015-2019)

VARIABLES	(1) **All Restatements**	(2) **All Restatements**	(3) **Material Restatements**	(4) **Material Restatements**	(5) **Revenue and Accruals Related Restatements**	(6) **Revenue and Accruals Related Restatements**	(7) **SEC Investigations**	(8) **SEC Investigations**
	2010 - 2014	**2015 - 2019**	**2010 - 2014**	**2015 - 2019**	**2010 - 2014**	**2015 - 2019**	**2010 - 2014**	**2015 - 2019**
Consulting	-0.025***(a)	-0.024***(a)	-0.003(b)	-0.005*(b)	-0.008(c)	-0.011***(c)	0.000(d)	-0.001(d)
	(-3.091)	(-4.424)	(-0.703)	(-1.737)	(-1.584)	(-3.097)	(0.029)	(-1.170)
All other controls as in Table 4	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12,049	10,889	12,049	10,889	12,049	10,889	12,049	12,049
R-squared	0.072	0.079	0.072	0.063	0.042	0.063	0.036	0.072
Year, Industry, MSA FE	YES	YES	YES	YES	YES	YES	YES	YES

(a) Difference between (1) and (2) with Chi-square = 0.01, p=0.943

(b) Difference between (1) and (2) with Chi-square = 0.11, p=0.739

(c) Difference between (1) and (2) with Chi-square = 0.20, p=0.652

(d) Difference between (1) and (2) with Chi-square = 0.39, p=0.530

Panel B: Consulting and Big 4 versus non-Big 4 Firms

VARIABLES	(1) **All Restatements**	(2) **Material Restatements**	(3) **Revenue and Accruals Related Restatements**	(4) **SEC Investigations**
Big 4				
Consulting	-0.027***(e)	-0.004(f)	-0.010***(g)	-0.001(h)
	(-4.951)	(-1.458)	(-2.934)	(-0.363)
All other controls as in Table 4	Yes	Yes	Yes	Yes
Observations	18,378	18,378	18,378	18,378
R-squared	0.083	0.066	0.048	0.035
Year, Industry, MSA FE	YES	YES	YES	YES
Non-Big 4				
Consulting	-0.030**(e)	-0.016*(f)	-0.022**(g)	-0.002(h)
	(-2.323)	(-1.707)	(-2.397)	(-0.590)
All other controls as in Table 4	Yes	Yes	Yes	Yes
Observations	4,560	4,560	4,560	4,560
R-squared	0.110	0.086	0.102	0.070
Year, Industry, MSA FE	YES	YES	YES	YES

(e) Difference between (1) and (2) with Chi-square = 0.06 , p=0.811

(f) Difference between (1) and (2) with Chi-square = 1.50, p=0.221

(g) Difference between (1) and (2) with Chi-square = 1.45, p=0.228

(h) Difference between (1) and (2) with Chi-square = 0.15, p=0.700

Panel C: Probability of restatements and strength of consulting practice, firm-level analysis

VARIABLES	(1) **All Restatements**	(2) **Material Restatements**	(3) **Revenue and Accruals Related Restatements**	(4) **SEC Investigations**
Consulting_firm	-0.033***	-0.004*	-0.014***	-0.001
	(-7.240)	(-1.696)	(-4.599)	(-0.695)
NAS_office	0.003	-0.000	-0.012	0.001
	(0.237)	(-0.017)	(-1.368)	(0.208)
NAS_client	0.008*	0.005*	0.005*	0.000
	(1.867)	(1.813)	(1.750)	(0.463)
Big4	0.064***	-0.017*	0.034***	-0.000
	(4.195)	(-1.801)	(3.377)	(-0.099)
Importance	0.007	0.004	0.002	0.001
	(1.018)	(1.233)	(0.469)	(0.322)
Audit competition	0.012	0.008	0.008	0.001
	(1.151)	(1.358)	(1.200)	(0.215)
ExpertMSA	-0.156**	-0.033	-0.072*	-0.024
	(-2.569)	(-1.214)	(-1.708)	(-1.334)
Clients	-0.011	0.002	-0.007	-0.001
	(-1.527)	(0.433)	(-1.571)	(-0.739)
Size	-0.001	-0.005	0.000	0.003
	(-0.135)	(-1.287)	(0.110)	(1.630)
Firm age	-0.013***	-0.004*	-0.002	-0.000
	(-3.163)	(-1.742)	(-0.678)	(-0.392)
Current ratio	-0.009***	-0.004**	-0.006***	-0.002***
	(-2.858)	(-2.233)	(-3.591)	(-3.350)
ROA	0.003	0.001	0.006***	0.001*
	(0.765)	(0.265)	(3.695)	(1.878)
Leverage	0.007*	0.003	0.004*	0.001
	(1.947)	(1.572)	(1.710)	(1.121)
Z-score	0.000	0.000	0.001	0.000
	(0.103)	(0.300)	(0.797)	(0.712)
Bussegments	0.008*	0.000	-0.001	-0.001*
	(1.934)	(0.171)	(-0.210)	(-1.741)
Sales growth	0.002	0.002	0.002	0.000
	(0.886)	(1.527)	(1.224)	(0.599)
M&A	0.021***	0.011***	0.010**	-0.001
	(3.141)	(3.008)	(2.169)	(-0.406)
Discontinued operations	0.019*	0.004	0.004	-0.002
	(1.905)	(0.748)	(0.562)	(-0.839)
Foreign operations	0.019**	-0.007	0.002	-0.001
	(2.208)	(-1.269)	(0.286)	(-0.744)
ICW	0.260***	0.173***	0.136***	0.032***
	(14.425)	(11.847)	(9.517)	(4.748)
Busy season	-0.018*	-0.004	-0.011*	0.001
	(-1.882)	(-0.721)	(-1.711)	(0.604)
Auditor change	0.063***	0.048***	0.030***	0.006
	(4.670)	(5.099)	(3.261)	(1.386)
Constant	0.085***	0.048***	0.019*	0.007
	(5.148)	(4.656)	(1.823)	(1.483)
Observations	22,940	22,940	22,940	22,940
R-squared	0.071	0.058	0.042	0.026
Year, Industry, MSA FE	YES	YES	YES	YES

TABLE 6
Cross-sectional analysis: consulting and clients' characteristics

This table reports results of the regression of the likelihood of restatements on the share of consulting employees in the audit office ($Consulting_{i,t}$) and the interaction term between the share of consulting employees and proxies of audit complexity ($Complexity_{i,t}$). In Columns 1, 2, 3, and 4 report four proxies of complexity: client size ($Size_{i,t}$), the client's importance for the audit office ($Importance_{i,t}$), presence of Foreign Operations ($Foreign\ Operation_{i,t}$), and the number of business segments ($Numbusseg_{i,t}$), respectively. All variables are defined in Appendix A. We winsorize all continuous control variables at the 1 and 99 percentiles and standardize them to have standard deviations equal to one. The OLS regression is estimated with issuer's industry, office's MSA, and year fixed affects. Standard errors are clustered by issuer. ***,**,* signify statistical significance at the 1%, 5%, and 10% levels of significance, respectively.

VARIABLES	(1) **All Restatements**	(2) **All Restatements**	(3) **All Restatements**	(4) **All Restatements**
Consulting	-0.024*** (-4.803)	-0.028*** (-5.676)	-0.018*** (-3.230)	-0.024*** (-5.396)
Consulting*Size	-0.020*** (-5.811)			
Size	0.000 (0.060)			
Consulting*Importance		-0.015*** (-3.812)		
Importance		-0.002 (-0.348)		
Consulting*Foreign operations			-0.010* (-1.720)	
Foreign operations			0.024*** (2.665)	
Consulting*Numbusseg				-0.011*** (-3.569)
Numbusseg				0.011** (2.435)
All other controls as in Table 4	YES	YES	YES	YES
Observations	22,940	22,940	22,940	22,940
R-squared	0.071	0.069	0.050	0.051
Year, Industry, MSA FE	YES	YES	YES	YES

TABLE 7
Probability of restatements and consulting employees' skills characteristics

This table reports the impact of consulting employees' skills on the likelihood of restatements. Panel A presents regression results of the likelihood of restatements on the share of consulting employees in the audit office (*Consulting*$_{i,t}$) for two subsamples: (i) offices where auditors' and consultants' skillsets are distinct and (ii) offices where the skillsets are similar. The offices with distinct skillsets defined as those where skills' distributions are significantly different between audit and consulting employees with the p-value of the Chi-square test less than or equal to 10%. Offices with the similar skillsets are those where the p-value of the Chi-square test is greater than 10%. Panel B reports the results of the regression of the likelihood of restatements on the share of consulting employees in the audit office (*Consulting*$_{i,t}$) for subsamples of offices with HIGH and LOW percentage of the five most common consulting skillsets: *Specific Industry*, *Technical*, *Management*, *Accounting*, and *Operations* skills. We define office as HIGH (LOW) in these skills if the proportion of consulting employees with these primary skills is above (below) the median in year *t*. All variables are defined in Appendix A. We winsorize all continuous control variables at the 1 and 99 percentiles and standardize them to have standard deviations equal to one. The OLS regression is estimated with issuer's industry, office's MSA, and year fixed affects. Standard errors are clustered by issuer. ***,**,* signify statistical significance at the 1%, 5%, and 10% levels of significance, respectively.

Panel A: Diversion in skills between accounting and consulting employees

VARIABLES	(1) **All Restatements**	(2) **All Restatements**
Consulting	-0.034***(a)	-0.007(a)
	(-5.860)	(-0.677)
All other controls as in Table 4	Yes	Yes
Observations	16,653	6,286
R-squared	0.082	0.085
Year, Industry, MSA FE	YES	YES
Sample	Skills' distributions are significantly different between Audit and Consulting (p Chi-square <=10%)	Skills' distributions are not significantly different between Audit and Consulting (p Chis-square >10%)

(a) Difference between (1) and (2) with Chi-square = 3.42, p=0.064

Panel B: Consulting employees' specific skills

VARIABLES	(1) **All Restatements** Offices with HIGH shares of specific skills among consultants	(2) **All Restatements** Offices with LOW shares of specific skills among consultants
Specific Industry Skills		
Consulting	-0.035***(a)	-0.007(a)
	(-5.814)	(-0.809)
All other controls as in Table 4	YES	YES
Observations	14,766	8,172
R-squared	0.077	0.097
Technical Skills		
Consulting	-0.037***(b)	-0.011(b)
	(-5.865)	(-1.023)
All other controls as in Table 4	YES	YES
Observations	13,957	8,980
R-squared	0.089	0.083
Management Skills		
Consulting	-0.031***(c)	-0.010(c)
	(-5.865)	(-1.023)
All other controls as in Table 4	YES	YES
Observations	13,957	8,980
R-squared	0.089	0.083
Accounting Skills		
Consulting	-0.020**(d)	-0.035***(d)
	(-2.328)	(-5.668)
All other controls as in Table 4	YES	YES
Observations	10,483	12,455
R-squared	0.063	0.100
Operations Skills		
Consulting	-0.030***(e)	-0.034***(e)
	(-5.289)	(-3.312)
All other controls as in Table 4	YES	YES
Observations	15,142	7,796
R-squared	0.091	0.078

(a) Difference between (1) and (2) with Chi-square = 7.68, p=0.0056
(b) Difference between (1) and (2) with Chi-square = 3.11, p=0.0779
(c) Difference between (1) and (2) with Chi-square = 4.74, p=0.0295
(d) Difference between (1) and (2) with Chi-square = 2.84, p=0.0920
(e) Difference between (1) and (2) with Chi-square = 0.05, p=0.8243

TABLE 8
Additional analysis: Office size

This table reports regression results of the likelihood of restatement on the share of consulting employees in the audit office ($Consulting_{i,t}$) separately for each tercile of audit offices based on office size. Columns 1, 2, and 3 display the regression results in the low, medium, and high terciles, respectively. All variables are defined in Appendix A. We winsorize all continuous control variables at the 1 and 99 percentiles and standardize them to have standard deviations equal to one. The OLS regression is estimated with issuer's industry, office's MSA, and year fixed affects. Standard errors are clustered by issuer. ***,**,* signify statistical significance at the 1%, 5%, and 10% levels of significance, respectively.

VARIABLES	(1) **All Restatements** Offices in the LOW tercile of employees	(2) **All Restatements** Offices in the MEDIUM tercile of employees	(3) **All Restatements** Office in the HIGH tercile of employees
Consulting	0.000 (a) (b)	-0.046*** (a)	-0.031*** (b)
	(0.030)	(-3.617)	(-4.981)
All other controls as in Table 4	YES	YES	YES
Observations	3,382	5,725	13,828
R-squared	0.116	0.098	0.089
Year, Industry, MSA FE	YES	YES	YES

(a) Difference between (1) and (2) with Chi-square = 4.97, p= 0.0258
(b) Difference between (1) and (3) with Chi-square = 3.09, p= 0.0787

TABLE 9
Additional analysis: Impact of employee's firm tenure

This table reports regression results of the likelihood of restatement on the share of consulting employees in the audit office ($Consulting_{i,t}$) and the interaction between the share of consulting employees and the average consulting ($ConsEmpFirmTenure_{i,t}$) and auditing employees' ($AuditEmpFirmTenure_{i,t}$) firm tenure. Firm tenure is the number of years an employee was employed at audit firm. Column 1 presents the regression of the likelihood of restatement on $Consulting_{i,t}$, $ConsEmpFirmTenure_{i,t}$, and the interaction between $Consulting_{i,t}$ and $ConsEmpFirmTenure_{i,t}$. Column 2 shows regression results of the likelihood of restatement on $Consulting_{i,t}$, $AuditEmpFirmTenure_{i,t}$, and the interaction between $Consulting_{i,t}$ and $AuditEmpFirmTenure_{i,t}$. Column 3 combines the analysis of both consulting and audit employees' firm tenure. All variables are defined in Appendix A. We winsorize all continuous control variables at the 1 and 99 percentiles and standardize them to have standard deviations equal to one. The OLS regression is estimated with issuer's industry, office's MSA, and year fixed affects. Standard errors are clustered by issuer. ***,**,* signify statistical significance at the 1%, 5%, and 10% levels of significance, respectively.

	(1)	(2)	(3)
VARIABLES	**All Restatements**	**All Restatements**	**All Restatements**
Consulting	-0.028***	-0.027***	-0.029***
	(-4.932)	(-5.461)	(-5.014)
ConsEmpFirmTenure	0.008		0.009
	(1.100)		(1.284)
ConsEmpFirmTenure		0.005	0.004
		(1.317)	(1.259)
Consulting * ConsEmpFirmTenure	-0.005*		-0.006**
	(-1.683)		(-1.970)
Consulting * AuditEmpFirmTenure		0.011***	0.012***
		(2.831)	(3.027)
All other controls as in Table 4	YES	YES	YES
Observations	22,940	22,940	22,940
R-squared	0.069	0.069	0.069
Year, Industry, MSA FE	YES	YES	YES

TABLE 10
Additional analysis: Alternative proxies for audit quality

In this table, we re-estimate equation (1) using: audit fees (Column 1), the propensity to meet or beat analysts' forecasts by one cent (Column 2), absolute total accruals (Column 3), and absolute discretionary accruals (Column 4) as alternative dependent variables. *Audit fees* are the natural logarithm of audit fees reported in Audit Analytics. *Propensity to meet or beat analysts' earnings forecasts* is an indicator variable that is equal to one if a firm's EPS minus the consensus analysts' forecast is between zero and one cent (inclusive), and zero otherwise. *Accruals* and all independent variables are defined in Appendix A. We winsorize all continuous control variables at the 1 and 99 percentiles and standardize them to have standard deviations equal to one. The OLS regression is estimated with issuer's industry, office's MSA, and year fixed affects. Standard errors are clustered by issuer. ***,**,* signify statistical significance at the 1%, 5%, and 10% levels of significance, respectively.

VARIABLES	(1) **Audit fees**	(2) **Propensity to meet or beat analysts' earnings forecasts**	(3) **Absolute total accruals**	(4) **Absolute discretionary accruals**
Consulting	0.026***	-0.006*	-0.001	-0.001
	(2.990)	(-1.840)	(-0.966)	(-0.595)
All other controls as in Table 4	YES	YES	YES	YES
Observations	22,917	17,091	22,924	22,796
R-squared	0.844	0.026	0.263	0.242
Year, Industry, MSA FE	YES	YES	YES	YES