Rev Account Stud
https://doi.org/10.1007/s11142-018-9458-y

Audit personnel salaries and audit quality

Jeffrey L. Hoopes[1] · **Kenneth J. Merkley**[2] · **Joseph Pacelli**[2] · **Joseph H. Schroeder**[2]

Abstract This study examines the relation between audit personnel salaries and office-level audit quality. We measure audit personnel salaries at the associate, senior, and manager ranks for Big 4 audit offices from 2004 to 2013, using unique individual-auditor-level data obtained from the U.S. Department of Labor. We find that offices that pay lower salaries have a higher percentage of clients that experience restatements. In related analyses, we also find lower levels of audit quality when audit employees are paid less, relative to other lines of service in accounting firms. Finally, we document positive and significant associations between salary and fees, suggesting that audit offices pass some of the cost of higher labor onto their clients. Overall, our findings provide important initial evidence on the role of audit salary and its relation to audit quality and audit fees.

Keywords Audit personnel salary · Audit quality · Salary determinants · Audit fees

JEL classification M41 · M42 · M51 · M52

✉ Jeffrey L. Hoopes
hoopes@unc.edu

Kenneth J. Merkley
kenmerk@iu.edu

Joseph Pacelli
jpacelli@indiana.edu

Joseph H. Schroeder
jhschroe@indiana.edu

[1] University of North Carolina at Chapel Hill, Chapel Hill, NC, USA

[2] Indiana University, Bloomington, IN, USA

Published online: 05 July 2018

1 Introduction

In recent years, the auditing profession has undergone significant changes, and the work required to perform public company financial statement audits has increased substantially. Despite increased expectations, workloads, and complexity (Laux and Leuz 2009; Persellin et al. 2015; Hanson 2013), anecdotal evidence suggests auditors' real starting salaries have remained relatively unchanged and have underperformed alternative career options (e.g., consulting, tax, and corporate accounting). Given that audit personnel (e.g. associates, seniors, and managers) play a critical role in the audit process, it is important to understand how the profession can incentivize and attract high quality auditors (DeFond and Zhang 2014). Even though compensation is likely to be an important incentive, our understanding of whether salaries influence audit quality is limited to a few studies on audit partner compensation (e.g., Carcello et al. 2000; Knechel et al. 2013) and anecdotal evidence. Using a unique data set of audit personnel salaries, we seek to better understand how the salaries of audit professionals relate to audit office quality and how this relationship varies with the attractiveness of alternative career options within accounting firms.

Ex ante, the relation between audit personnel salary and audit quality is not clear. On the one hand, efficiency wage theories imply that higher wages should improve audit personnel productivity by motivating greater effort from audit personnel and/or by attracting higher quality personnel, because providing an above market-clearing wage makes it more costly for employees to switch to alternative lower-paying jobs (Akerlof 1984; Yellen 1984; Akerlof and Yellen 1986; Shapiro and Stiglitz 1984; Levine 1993).[1] Thus, if higher salaries help attract or retain higher quality audit personnel, we expect audit personnel salaries to be *positively* related to audit quality. This finding would also be consistent with regulatory claims that stagnant salaries in the audit profession are reducing worker quality in the audit industry, as accounting majors avoid becoming auditors and instead become tax accountants or consultants.[2]

On the other hand, neoclassical views of the firm suggest that employees are homogenous and substitutable inputs into the production process, allowing little to no role for individuals to influence outcomes of the firm (Weintraub 2002; Bertrand and Schoar 2003; Bamber et al. 2010; Dyreng et al. 2010). This claim might especially hold true in the audit industry, as firms use a very standardized audit methodology, have uniform requirements for engagement teams, and maintain highly developed training programs to ensure consistency in audit delivery. To the extent that audit personnel, especially associates, are relatively homogenous inputs and technologies within audit firms require little individual judgment, there may be no relation between audit personnel salaries and audit quality. Further, salary may not be the most important

[1] For additional theoretical studies examining the efficiency wage theory, see Malcomson (1981), Akerlof and Yellen (1990), Yellen (1995), Fehr and Gächter (2000), and Chen and Sandino (2012). For additional empirical studies providing evidence consistent with the efficiency wage theory, see Levine (1993), Cappelli and Chauvin (1991), Fehr et al. (1993), Marti (1997), Fehr and Falk (1999), Hannan et al. (2002), Hannan (2005), Stevens and Thevaranjan (2010), and Chen and Sandino (2012).

[2] The concern that uncompetitive salaries steer potential accountants into more lucrative careers is not new. For example, in 2000, it was noted that one reason why the quantity and quality of accounting students was reported to be falling was due to "starting salaries for accounting majors not increasing at the same rate as for other business majors" (Albrecht and Sack 2000).

incentive in the audit profession; incoming personnel are more motivated by other factors, such as an audit firm's reputation, location, or clients. Ultimately, whether audit personnel salaries are associated with audit quality is an empirical question that has implications for the audit profession as a whole.

Examining the relation between audit personnel salary and audit quality is challenging, since salary information it is not readily available. We overcome this data limitation by using 12,796 publicly available worker visa applications (H-1B visas), provided by the Department of Labor, to proxy for salaries offered to audit associates, seniors, and managers across 185 local U.S. offices of Big 4 audit firms from 2004 to 2013.[3] These applications allow us to observe wages offered by audit firms across time, service lines, ranks, and location. Although H-1B visas are issued to non-U.S. citizens, this visa program prohibits audit firms from offering salaries that are less than the wage offered to domestic graduates (Aobdia et al. 2017). Consequently, the salary data used from these visa applications reasonably proxy for the prevailing wage offered to *all* entering personnel for each audit-firm office and should capture wages at the associate rank, as many of these employees enter Big 4 audit firms upon graduation from U.S. universities. We further validate these claims through discussions with Big 4 recruiters and analyses using proprietary placement data from three top-tier universities.

We begin our analyses by providing descriptive evidence on the factors associated with variation in audit personnel salaries. We restrict our analysis to Big 4 firms as they have similar levels of resources, compete for similar types of individuals, and conduct audits of similar quality (e.g., Reynolds and Francis 2000; Francis 2011; DeFond and Zhang 2014). The average associate in our sample earns $54,356 per year, while seniors and managers earn substantially higher average salaries of $71,663 and $86,730, respectively. While salaries appear to have risen from 2004 to 2013, inflation-adjusted salaries have remained relatively stagnant and, in some cases, have actually declined. In multivariate analyses, we further explore economic factors related to variation in audit personnel salaries. We find that salaries are positively associated with MSA-level characteristics, including home prices, population, and education, consistent with the cost of living and the supply of talented human capital explaining some of the variation in audit personnel salaries across MSAs (Beck et al. 2017). We also examine audit-office characteristics and find that, while market leaders pay lower salaries, audit offices with a mix of clients from more diverse industries pay higher salaries. This suggests that market leaders can attract labor at a lower cost, while more job complexity requires higher salaries.

We next consider the implications of audit salaries for audit office quality. To do so, we conduct our analyses using three levels of aggregation. In our first analysis, we measure audit office quality as the percentage of clients within the audit office's portfolio that release misstated financial statements, as evidenced by the current-period financial statements being restated in future periods (e.g., Christensen et al. 2015; Aobdia 2016) and examine how office-level variation in misstatement frequency relates to individual salaries. We then modify this model by aggregating audit personnel

[3] The vast majority of our sample includes H-1B temporary, non-immigrant visa applications. The data also includes a small number of permanent worker visa applications. We also include in our definition of H-1B visa applications the labor condition application, which is filed by the employer as part of the visa application process. We refer to all of these applications as H-1B visa applications throughout the remainder of the study.

salary to the MSA level and finally by disaggregating audit quality to the client level. Across all three methods of aggregation, our results indicate that MSA audit offices that pay higher audit salaries conduct higher quality audits. Specifically, we find, in the individual salary analysis, an interquartile change in audit salary is associated with an 11% decrease in the rate of audit office client portfolio misstatements, relative to the sample mean.[4]

We next explore the implications of the audit industry's growing emphasis on tax and consulting practices for audit personnel salary and audit quality. Many audit firms have recently increased their recruitment efforts in these alternative service lines, often offering higher salaries than those offered for audit positions.[5] We contend that, as these alternative career options become more attractive, workers who would normally enter the audit profession may shift to these career paths within the accounting firms. This shift in talent can, in turn, have implications for overall audit quality. We re-estimate our audit quality models and replace our measure of audit personnel salary with a relative salary measure, measured as the difference between the individual wage offered at a given audit office and the average salary offered for Big 4 non-audit careers (i.e., consulting, tax, and information technology) in the local MSA (i.e., "the wage gap"). We find evidence that, as this wage gap increases (i.e., alternative career-path salaries become more attractive), audit-office quality declines. Specifically, an increase in the interquartile range of salary is associated with a reduction in office misstatement rates of 8.5%, relative to the sample mean.[6] Taken together, our findings suggest that both the *absolute* and *relative* salaries offered to audit personnel relate to the quality of public audits.

To strengthen our inferences, we perform additional analyses where we augment our models with both MSA and MSA-year fixed effects to control for both static and time-varying unobserved local heterogeneity that may be correlated with audit personnel salary and audit quality. The results based on MSA-year fixed effects are particularly important, as they rely on only variation within a given MSA and year, which helps alleviate concerns that time-varying geographical differences influence our findings. Inferences from these analyses remain unchanged.

Our final set of analyses examines whether audit firms can pass on higher labor costs via higher audit fees. We document a positive and significant association between audit personnel salaries and audit fees, consistent with audit firms passing some of their marginal labor costs onto their clients. Moreover, this relationship is most pronounced among associates and less pronounced among seniors and managers, suggesting that clients are less willing to bear the increased labor costs for higher ranked audit personnel. The positive relation between salary and fees is also most pronounced for audit firms that have greater MSA market share, consistent with these audit firms having greater audit pricing power.

Our paper makes several contributions to the accounting/audit literature. While audit quality is considered to be a function of the audit process and audit personnel (Francis

[4] We find that interquartile shifts in salaries result in lower misstatement rates of 7.23, 6.84, and 14.26%, relative to the subsample means for the associate, senior, and manager analyses, respectively.

[5] See, for example, http://www.big4guide.net/who-are-the-big-4/salaries/.

[6] We find that interquartile shifts in the wage gap are associated with misstatement rates that are 5.92, 5.94, and 12.3% lower, relative to the subsample means for the associate, senior, and manager analyses, respectively.

2011), there is limited research distinguishing between process and personnel effects (e.g., DeAngelo 1981; Ferguson et al. 2003; Carey and Simnett 2006; Francis and Yu 2009; Choi et al. 2010; Ghosh and Moon 2005; Venkataraman et al. 2008; Skinner and Srinivasan 2012).[7] We extend this literature by providing important evidence on the factors related to audit personnel salaries, a key indicator of personnel quality, and by demonstrating that higher absolute and relative audit personnel salaries relate to office-level audit outcomes associated with better audit quality.

Our study also contributes to a recent call for more work examining individuals and their competencies (i.e., human capital) involved in the audit process (Francis 2011; DeFond and Zhang 2014). Our study extends our understanding of how auditor compensation impacts audit quality from the partner level (e.g., Knechel et al. 2013) to the rank-and-file level. In addition, our findings complement those of Beck et al. (2017) by examining variation in human capital *within* an MSA (as reflected in audit firm salaries) as opposed to *across* MSAs (as reflected in education).

Our study is also important for the audit industry. The increasing responsibilities of audit personnel, due to more stringent PCAOB standards along with audit fee compression, may have impacted the profitability of Big 4 audit firms. A potential consequence of this is salary stagnation. Our evidence suggests that audit offices that offer higher and more competitive audit salaries do indeed provide higher quality audits. We also provide evidence that audit firms can pass some of the costs of higher audit labor onto their clients in the form of higher audit fees, especially for audit firms that are market leaders. This evidence should be of interest to regulators and practitioners, as both continue to balance the importance of regulation, high quality audits, and factors that attract the best and brightest to the audit profession.

2 Related literature and hypothesis development

2.1 Prior studies examining audit personnel and audit quality

A large literature examines the factors that determine audit quality. Understanding audit quality is a vital concern to audit firms, regulators, and investors and is a fundamental issue in the accounting literature. Audit quality improves financial reporting by enhancing the credibility of financial reports (DeFond and Zhang 2014). In turn, higher quality financial reporting improves resource allocation and contracting efficiency (e.g., Biddle et al. 2009).

Conceptually, audit quality can be viewed as a function of accounting processes (e.g., accounting systems, internal controls, economic transactions, regulations) and the personnel employed by both audit-firms and clients to carry out those processes (e.g., auditors, accountants, managers) (Francis 2011). The role of audit personnel is of particular importance, given that these individuals can play a critical role in the audit process. Moreover, one of the fundamental activities of the audit profession is to hire and train audit personnel (Francis 2011). This point is highlighted in a recent report in

[7] Recent research has begun to advance our understanding of personnel effects by focusing on aspects such as education and foreign labor in the audit profession (Barrios 2017; Beck et al. 2017; Aobdia et al. 2017; Bianchi 2018).

which PwC notes that "Our reputation depends on hiring talented professionals and our reputation for quality enables us to attract the best candidates (PwC 2017, p. 9)." Despite the importance of these issues, the questions of "what role do audit personnel play in impacting audit quality?" and "how can audit firms attract and incentivize higher quality audit personnel?" remain largely unanswered, in part due to the unavailability of data on audit personnel, especially in the United States.

A large number of studies use data at the audit-firm and client level to examine how audit quality relates to audit firm characteristics, such as size, tenure, industry specialization, and reputation, as well as client characteristics, such as competence and transaction complexity (DeAngelo 1981; Ferguson et al. 2003; Carey and Simnett 2006; Francis and Yu 2009; Choi et al. 2010; Ghosh and Moon 2005; Venkataraman et al. 2008; Skinner and Srinivasan 2012; DeFond and Zhang 2014). These studies generally cannot isolate the role of audit personnel or examine how firms compensate personnel because these factors relate to both accounting processes and personnel as well as other aspects of the auditing profession (e.g., audit firm market power and litigation risk). An alternative stream of literature seeks to isolate the role of audit personnel using experimental research designs. These studies find that auditors with higher expertise, knowledge, and ability perform better in isolated audit tasks (e.g., Bonner and Lewis 1990; Nelson and Tan 2005), consistent with auditor personnel having a significant influence on audit quality. However, these studies do not specifically address the role of audit personnel salary, and it is not clear whether and these results generalize to real-world environments (Libby et al. 2002). We seek to address this gap by examining the relationship between audit personnel salaries and audit quality using a large sample of audit salaries from Big 4 audit firms.

2.2 Audit personnel salary and audit quality

We argue that audit personnel salaries can have important effects on the quality of audit personnel attracted to or retained within audit-firms as well as the level of auditor effort, both of which ultimately affect the quality of audits. The issue of audit personnel salaries has become important in recent years, as the public accounting industry has undergone significant changes that have increased the responsibilities, task complexity, and workloads of auditors (Persellin et al. 2015).[8] New accounting standards and regulations, such as fair value accounting and internal control reporting, demand higher levels of subjective and judgmental decision-making (e.g., Laux and Leuz 2009) that potentially require more skilled auditors. Moreover, increased regulatory pressures from organizations like the PCAOB have also increased the burden associated with conducting a typical audit. Despite these increased demands, anecdotal evidence suggests that starting salaries over the past decade have underperformed alternative career options (e.g., tax, consulting, advisory services, and corporate accounting).

[8] In a 2012 speech about the state of the audit profession, PCAOB board member Jay Hanson expressed concerns that PCAOB inspections and standards may have affected the work-life of auditors, stating "one result of our activities … is that the best and brightest auditors become frustrated and leave the profession (Hanson 2012)." Later in 2013, Hanson, in a speech at the Baruch College's 2013 Financial Reporting Conference, further stated: "One exceptionally troubling issue that I sense is getting worse is the sheer number of hours that audit teams are expected to work. … How do you function if you are working 16 h per day on a continual basis? … If audit teams are working excessive hours, there is a problem (Hanson 2013)."

Despite its importance, few studies examine audit personnel salaries and their relation to audit quality, largely because of data constraints. Some studies focus on partner compensation as opposed to lower level rank-and-file employees' compensation. For example, Knechel et al. (2013) find that partners' compensation in Sweden is positively associated with client size, the number of clients, and the partner's ability to retain and attract new clients. Carcello et al. (2000) find no evidence of a relationship between partner compensation and going-concern decisions. While these studies enhance understanding of audit compensation, they do not speak directly to the role of rank-and-file audit personnel salary within the United States. This issue is particularly important given that lower-level audit personnel are responsible for conducting a vast majority of audit tasks.[9] Specifically, Aobdia (2017) finds that partner hours only represent 5% of total engagement hours for PCAOB inspected audits.

Ex ante, the relationship between audit personnel salary and audit quality is not clear. On the one hand, efficiency wage theories imply that higher wage levels will improve audit personnel productivity by motivating greater effort or attracting higher quality personnel (Malcomson 1981; Akerlof 1984; Yellen 1984, 1995; Akerlof and Yellen 1986, 1990; Shapiro and Stiglitz 1984; Fehr and Gächter 2000; Chen and Sandino 2012). The premise for these theories is that, when the quality of an employee's output is not perfectly observable (i.e., information asymmetry exists between the firm and the employee), offering above market-clearing wages can improve employee output by making it costly for the employee to leave.

Empirical studies in other settings provide evidence consistent with this theory and suggest that higher wages encourage higher employee effort, less shirking, greater employee satisfaction, less employee turnover, and more honesty (Levine 1993; Cappelli and Chauvin 1991; Fehr et al. 1993; Marti 1997; Fehr and Falk 1999; Hannan et al. 2002; Hannan 2005; Stevens and Thevaranjan 2010; Chen and Sandino 2012). Efficiency wage theories could also help to explain audit-firms' and regulators' concerns about the industry's ability to seek and retain high quality labor and reduce turnover (PwC 2017; Hanson 2012, 2013). Thus, if higher salaries help attract or retain higher quality audit personnel, we expect audit personnel salaries to relate positively to audit quality.[10]

On the other hand, there are also potential explanations for why audit personnel salary may not be associated with audit quality. First, the neoclassical view of the firm views employees as homogenous inputs into the production process that are perfectly substitutable, thus allowing no role for individuals to influence outcomes of the firm (Weintraub 2002; Bertrand and Schoar 2003; Bamber et al. 2010; Dyreng et al. 2010). This issue could be particularly important in the context of the audit industry, as firms have standardized audit methodologies, uniform requirements for engagement teams,

[9] Messier et al. (2008) finds evidence that partners tend to overestimate the ability of lower level personnel to detect fraud and other complex errors. While understanding partner compensation is important, it is also important to understand the relationship between audit personnel compensation and audit quality at the associate, senior, and manager level, given they play an important role in the external audit and that partners tend to over-estimate their ability.

[10] We focus on the overall pay of an audit office for a given audit firm. However, within an office, pay disparity may affect audit outcomes. It may be the case that generous partner compensation motivates staff, for example, to work hard and achieve partner, or it may be a demotivating factor. The distribution of pay across ranks within an auditor office is beyond the scope of this paper.

and highly developed training programs, all of which are designed to ensure consistency in audit delivery. Thus, if audit personnel are relatively homogeneous or if processes and procedures within audit-firms are standardized and allow for little judgment, there may be no relation between audit personnel salaries and audit quality.

Second, audit firms may compete for high quality labor not only based on salary but also based on less tangible aspects of the job, such as the quality of the experience offered and career opportunities afforded to applicants working at certain audit offices (Almer et al. 2005). For example, individuals in San Francisco may value the opportunity to work at an audit office that specializes in the tech industry, as this will have a positive impact on individuals' career prospects.[11] Indeed, as PwC (2017, p. 8) notes: "We provide world-class career development opportunities and the chance to work with some of the world's premier organizations." In such a framework, total audit compensation may be viewed as a function of salary and nonsalary components, such as deferred compensation and other nonpecuniary benefits. To the extent that individuals are willing to trade off salary for these other components of compensation, there may be no association between salary and audit quality. Thus the association between salary and audit quality is largely an empirical question. This leads to our first hypothesis (in null form).

H1: Absolute audit personnel salaries are not associated with audit quality.

The above arguments consider the relationship between audit personnel salaries and audit office quality. However, it is also important to note that the Big 4 have other, often more profitable, service lines, including tax, consulting, and information systems. These other service lines have recently been expanding. In growing their non-audit service lines, public accounting firms have invested heavily in attracting talent into these alternative service lines, often offering higher salaries than those offered for audit positions, inducing a wage gap in the accounting profession. Thus, as alternative career options within accounting firms become more attractive, high quality personnel who would normally enter the audit profession may instead shift to these alternatives. This behavior is consistent with the efficiency wage theory, as the costs of switching from audit to non-audit service lines decreases and thus limits the ability of an audit firm to attract and retain talented personnel in audit service lines. This shifting may be more pronounced if the career goal of an entry-level worker is not to ultimately be an auditor but to work for an individual company's in-house accounting or finance department. This goal can be achieved by working in Big 4 accounting or another service line, and if these other service lines offer initially higher starting salaries, they may be more attractive to accounting graduates. To the extent that audit personnel have an impact on audit quality, this shift in talent would have implications for overall audit quality. Accordingly, our second hypothesis considers the association between relative audit personnel salary (i.e., wage gap) and audit quality (in null form).

H2: Relative audit personnel salaries are not associated with audit quality.

[11] Other examples include nonmonetary perks, such as flexible seating arrangements (France 2015), maternity kits (EY 2016), less formal dress codes (Tysiac 2015), and more engaging training facilities (McGinn 2015).

3 Data and descriptive analysis

3.1 Audit personnel salary data

We construct office-level proxies of audit personnel salary using data collected from visa applications. We use both H-1B and permanent worker visa applications, although our data primarily consists of H-1B visa applications. The H-1B visa is a non-immigrant visa that nonpermanent workers in the United States apply for, under the Immigration and Nationality Act.[12] The H-1B visa application process is required for all foreign employees relocating from a foreign country, graduating and obtaining their first job, renewing their visa at their current job, or moving from job to job within the United States (as long as they have not obtained permanent status). Accordingly, even individuals working at the same firm over time may have to re-apply for a visa to keep their employment status at a firm. They may also apply for a permanent worker visa (permanent resident status), and we also capture these applications in our data. Portions of the visa application, including the portion completed by the employer (the labor conditions application), have become public record. Included in the public access visa application data are the applicant's job title, employer, employer location, job code, and starting salary (i.e., proposed wage).[13]

We obtain the public portion of the visa application data from the Department of Labor. We retain only observations from the Big 4 audit firms (i.e., PwC, EY, Deloitte, and KPMG), as data for these firms are consistently available for a large number of U.S. offices for our sample period and these firms tend to hire large numbers of international students. Furthermore, the Big 4 have similar technologies, audit methodologies, and processes. Thus, by focusing on the Big 4, we can better focus on the effect of personnel differences in audit office quality. Across the Big 4 audit firms, we manually examine approximately 4000 different job titles listed on visa applications and retain only those applicants in which the title indicates that the individual worked in an audit division of a Big 4 Audit Firm (as opposed to working in, say, tax, consulting, or information systems) for our audit salaries and worked for a Big 4 firm outside of its audit function for our analysis examining differences between auditor and non-auditor pay.

We also require the data to contain information regarding the rank of the individual at the audit firm (i.e., associate, senior, or manager). One feature of the Big 4 audit

[12] There are many different types of visas, depending on whether the applicant is an immigrant or a non-immigrant, the relationship of the applicant to a U.S. citizen, the country of origin of the applicant, and the type of work being performed. An H-1B visa is for an alien in a "specialty occupation," where a specialty occupation is one that, among other things, may require "attainment of a bachelor's or higher degree in the specific specialty (or its equivalent) as a minimum for entry into the occupation in the United States (Immigration and Nationality Act 214(h)(i)(1)(B))," which will generally include financial statement auditors.

[13] One might also consider controlling for or adjusting the dependent variable for the "prevailing wage" that firms are required to provide on their LCA they file in the H-1B filing process. Firms report a prevailing wage, which is the average wage for similar work in the area, in their LCA to demonstrate that they are complying with the law that requires immigrants receive wages at least equivalent to domestic workers. Given firm incentives to qualify workers as sufficiently paid, it is not clear what biases may exist in the prevailing wage value. Instead of using this potentially biased value, in some tests, we control for MSA-year fixed effects, which controls for the average wage that dominates in that geographic region in the year for Big 4 audits (as opposed to the prevailing wage, which will possibly take into account other types of auditors at other types of accounting firms).

setting is that there is significant conformity in the use of titles to designate employee rank across these firms as well as with respect to the tasks these ranks perform. We require the rank to be noted in the title and restrict our sample to associates, seniors, and managers in the audit firm, omitting senior managers and partners. A typical audit team has more associates than seniors and more seniors than managers. For example, in 2017, for every audit partner hour worked at PwC, there were 20.3 associate hours worked, and 4.0 manager hours (PwC 2017). Thus restricting to titles held by more individuals (i.e., lower-level employees) allows us to focus on a population with sufficient data to answer our research questions, as very few partners or senior managers are H-1B applicants.

From this sample, we obtain the applicant's salary, which we use as a proxy for audit personnel salary for a given job title at an audit office in a given year. Using H-1B visa data to proxy for audit personnel salary carries with it certain caveats. One potential concern is that H-1B visa applicants (i.e., foreign workers) may be paid differently than other employees in a systematic way *and* that this difference may vary with the constructs we are investigating, thus undercutting the validity of our measures. However, for employers to obtain H-1B visas, they must file a labor condition application with the U.S. Secretary of Labor, stating that the wages they are offering are at least the greater of "the actual wage paid by the employer to all other individuals with similar experience and qualifications for the specific employment in question or the prevailing wage level for the occupational classification in the area of employment" (INA § 212(n)-(p); 8 U.S.C. 1182(n)-(p)). Note, too, that there is no conclusive evidence in the literature finding that foreign audit personnel are paid less than domestic audit personnel (Aobdia et al. 2017). Moreover, even if international audit personnel were paid differently, that difference would have to vary systematically across local audit firm offices to raise concerns—for example, if foreign auditors were always paid 10% more (or less) than domestic auditors, the proxy would still be a valid measure to capture variation in audit personnel pay across firms. Another potential concern is that employees receive visas to work on international audit rotations in the United States. This concern is likely less significant at the associate level, as many of the employees who receive visas at this level enter the Big 4 firms after graduating from U.S. universities.

We further confirm these assertions by consulting with national human resources/recruiting managers from two Big 4 firms. These discussions confirm that Big 4 firms provide the same starting salaries for domestic and international employees with H-1B visas. Furthermore, these discussions provide more insight on how salaries are determined across the various Big 4 audit offices. There is a base salary that is determined for a given year, which is then adjusted for cost-of-living at the various audit offices. Additional adjustments occur based on the specific MSA market factors to ensure that the audit office is competitive in obtaining personnel. For example, PwC in Indianapolis might offer a higher salary than EY (market leader) to attract higher quality candidates into their office. In short, human resources/recruiting managers at Big 4 firms indicate that there is variation in pay across audit offices within a given audit firm and across locations, based on specific market factors.

Nevertheless, to validate our measure, we obtain proprietary placement data from three large accounting programs in the United States that regularly place many students into Big 4 audit offices across the United States. Our placement data indicate the

accounting firm, location, and job title for 1796 graduates over a 10-year sample period for 46 different MSA locations. We then compare these salaries with those of H-1B applicants at the associate level and find that the correlation is 66%. Note that this comparison is not perfect, as H-1B visa applicant associates may be first-, second-, or even third-year auditors, while recent graduates from master's and bachelor's programs will almost universally be first year associates. Further, the schools we obtained data from are all frequently ranked as some of the best accounting programs, and their salaries may not reflect the salaries offered by lower tier schools. However, even given these potential discrepancies, the relatively high correlation helps assuage concerns that H-1B visa applicants' salaries are dissimilar from starting salaries in general.[14] We further validate our use of H-1B visa data to proxy for general auditor salaries through additional analyses (discussed in section 5.4), where we use salary data from graduates from three universities to replicate our main results.

We combine our visa data with Compustat data to create our control variables and data from Audit Analytics to obtain the audit firm identification, restatement measures, and audit fee measures. We also obtain data from a variety of other sources to measure MSA or city-level constructs (Zillow, Bureau of Labor Statistics, etc.). As the dependent variable in our primary tests is an aggregate measure of audit office quality (i.e., percentage of restatements in an audit office), we aggregate all control variables to this level. For example, we sum the total number of restatements across all of the EY clients in the McLean, Va., office and scale by the total number of clients to obtain the percentage of EY McLean, Va., clients that had a restatement. In additional analyses, we consider alternative forms of aggregation. All other variables are defined in the appendix Table 10. Our sample ranges from 2004 to 2013. We require at least 2 years of data to determine if the current year financial statements contain a misstatement that will be subsequently restated in future periods. Our final sample consists of 12,796 auditor office/year observations.

3.2 Descriptive analysis of data

We begin our analysis by providing initial descriptive evidence on audit personnel salaries. Figure 1 plots average annual auditor salary over the sample period for associates, seniors, and managers. We plot salaries using both unadjusted salary data (Panel A) and CPI-adjusted salary data (Panel B). Not surprisingly, the figure indicates that the mean salary for associates is reliably lower than that of seniors, which, in turn, is always lower than salaries for managers. The figure also indicates that, on average, nominal auditor salaries appear to rise over our sample period with initial salaries rising from approximately $47,000 to $56,000 for associates (1.8% average annual increase), $57,000 to $74,000 for seniors (2.7% average annual increase) and $73,000 to $89,000 for managers (2.1% average annual increase). Salaries also appear to decline around the financial crisis and toward the end of the sample period. However, in Panel B, trends in inflation-adjusted salaries indicate that these nominal salary increases often end up

[14] Some H-1B applicants graduate from these three universities and will in fact be included in our sample. But, in these three universities, the majority of graduates are domestic students who will not be H-1B applicants. The three universities that gave us graduate salary data did not provide us with the visa status of their graduates.

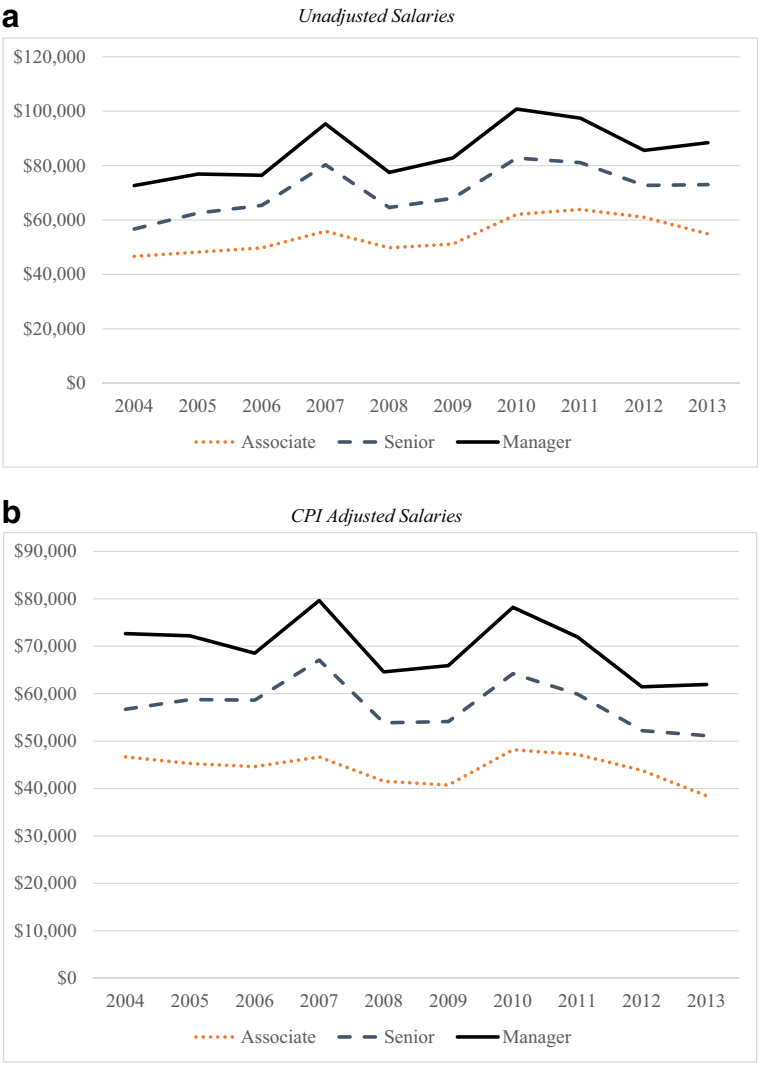

Fig. 1 Average auditor salaries over time. This figure displays average audit salaries from 2004 to 2013, based on data obtained from H-1B visa applications. The bottom line presents the average salary for associates. The middle line presents the average salary for seniors. The top line presents the average salary for managers

being near zero in terms of annual average increases. This trend is consistent with anecdotal evidence that auditor pay increases have been relatively small in recent years.

Table 1 further explores salary trends for the pooled sample and across the Big 4 audit firms. The average salary across all ranks and years in our sample is $65,419.[15] The

[15] This value is invariably affected by the fact that, as we progress to more experienced job positions, we have fewer visa applications, both because there are fewer people in these positions and because people who advance may achieve permanent status and not need to file for a visa. These data also represent our oversampling of larger cities, where the cost of living is higher (assuming the cost of living affects salaries, which we verify in Section 4).

Table 1 Audit salary descriptive statistics

	N	Mean	SD	P25	P50	P75
Pooled sample						
All	12,796	65,419	21,126	50,885	59,000	74,000
Associate	6237	54,356	11,755	47,000	51,500	57,000
Senior	4698	71,663	21,100	58,000	65,603	79,083
Manager	1861	86,730	22,790	70,541	82,000	98,000
PwC						
All	1241	66,841	22,076	49,608	61,677	78,500
Associate	630	57,372	17,520	45,198	51,000	64,100
Senior	428	71,124	20,509	56,282	66,143	77,886
Manager	183	89,429	20,154	73,986	86,700	95,300
EY						
All	5106	65,354	21,303	50,050	58,510	73,891
Associate	2918	55,068	11,711	48,000	52,000	58,500
Senior	1685	74,652	21,496	60,500	67,650	87,500
Manager	503	93,878	23,400	75,296	87,786	112,700
Deloitte						
All	3032	62,467	17,884	51,000	57,000	69,250
Associate	1156	51,473	8880	46,045	51,000	55,000
Senior	1142	65,756	18,304	55,300	61,331	70,000
Manager	734	74,666	17,897	61,000	71,700	85,000
KPMG						
All	3417	67,618	22,792	51,010	61,000	78,039
Associate	1533	53,938	10,233	47,363	51,750	57,699
Senior	1443	73,007	21,929	59,093	67,250	80,375
Manager	441	97,538	21,165	82,000	94,600	112,866

This table presents descriptive statistics for auditor salaries within the sample. Data is summarized for the full sample (pooled sample) and individually for each of the Big 4 Auditors: PwC, EY, Deloitte, and KPMG

average associate earns $54,356 per year, while seniors and managers earn substantially higher salaries ($71,663 and $86,730, respectively). Across the Big 4 audit firms, in our sample, the average salary for KMPG is the highest ($67,618 per year), while the average salary of Deloitte is the lowest average salary ($62,467). Note that these unconditional descriptive comparisons cannot speak to whether a Big 4 firms pay more than another when conditioning on relevant factors (e.g., location, client base, experience, or time).

Table 2 provides the frequency of audit-salary observations in our sample. Panels A and B provide the frequency by location (city and MSA, respectively). Not surprisingly, hiring is more likely to occur in major cities and MSAs. New York City and the New York City MSA account for 24.3 and 27.1% of our sample, respectively. Importantly, the table also indicates heterogeneity across cities and MSAs within our sample. Major audit-offices including Chicago, Boston, Los,

Table 2 Frequency of audit salary

Panel A: Frequency by city		
City	**# of Obs**	**% of Sample**
New York City, NY	3109	24.3%
Chicago, IL	830	6.5%
Boston, MA	670	5.3%
Los Angeles, CA	647	5.1%
Mclean, VA	607	4.7%
San Francisco, CA	548	4.3%
San Jose, CA	536	4.2%
Houston, TX	531	4.2%
Philadelphia, PA	423	3.3%
Atlanta, GA	420	3.3%
Dallas, TX	402	3.1%
Detroit, MI	283	2.2%
Stamford, CT	255	2.0%
Minneapolis, MN	216	1.7%
Mountain View, CA	202	1.6%
Other Cities	3117	24.2%
Total	12,796	100.0%
Panel B: Frequency by MSA		
MSA	**# of Obs**	**% of Sample**
New York-Newark-Edison, NY-NJ-PA	3468	27.1%
Chicago-Merrillville-Schaumburg, IL-IN	837	6.5%
San Jose-Sunnyvale-Santa Clara, CA	837	6.5%
Los Angeles-Long Beach-Santa Ana, CA	819	6.4%
Boston-Cambridge-Quincy, MA-NH	673	5.3%
Washington-Arlington-Alexandria, DC-VA-MD-WV	621	4.9%
San Francisco-Oakland-Fremont, CA	599	4.7%
Houston-Baytown-Sugar Land, TX	531	4.2%
Dallas-Fort Worth-Arlington, TX	450	3.5%
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	429	3.4%
Atlanta-Sandy Springs-Marietta, GA	426	3.3%
Other MSA	3106	24.2%
Total	12,796	100.0%
Panel C: Frequency by auditor		
Audit firm	**# of Obs**	**% of Sample**
PricewaterhouseCoopers	1241	9.7%
Ernst & Young	5106	39.9%
Deloitte	3032	23.7%
KPMG	3417	26.7%
Total	12,796	100.0%

Table 2 (continued)

Panel D: Frequency by year		
Year	**# of Obs**	**% of Sample**
2004	897	7.0%
2005	1018	8.0%
2006	1239	9.7%
2007	1714	13.4%
2008	1492	11.7%
2009	1292	10.1%
2010	1034	8.1%
2011	1379	10.8%
2012	1442	11.3%
2013	1289	10.1%
Total	12,796	100.0%

This table presents the frequency of audit salary observations in our sample. Panel A presents the frequency by city. Panel B presents the frequency by MSA. Panel C presents the frequency by auditor. Panel D presents the frequency by year

Angeles, San Francisco, and Mclean, Va. (just outside of Washington DC), are well-represented and constitute 25.9% of the sample. Panel C presents the distribution across auditors. EY constitutes the greatest portion of our sample (39.9% of observations). Similar to those of Aobdia et al. (2017), our statistics also indicate that PwC constitutes a small portion of the visa sample (9.7% of observations). Panel D provides the frequency by year. The table indicates that observations are generally well distributed across years.

In Fig. 2, we examine cross-sectional variation in audit personnel salaries across states. To do so, we produce heat maps that illustrate salary ranges, where darker values indicate higher salaries. Panel A illustrates geographic variation in associate salary, and Panels B and C illustrate geographic variation in senior and manager salaries, respectively. Notably, the heat maps indicate that California, New York, and Illinois consistently have the highest salaries across all three ranks, perhaps due to the high costs of living and high demand for auditing services in metropolitan areas in these states. Smaller states not well-known for their public auditing services, such as Idaho, Kentucky, Mississippi, West Virginia, and Nebraska, have the lowest salary levels.[16]

Table 3 provides descriptive statistics for the variables used in the sample. On average, 9.2% of the clients at a typical audit office experience future restatements related to their financial accounting for the current fiscal year (*MISSTATE%*). Audit-offices in our sample (which are only Big 4 firms) also tend to have large market share (mean *Audit Market Share* = 23.1%, the ratio of MSA audit office fees to total audit fees for a given MSA) and diverse client sets (mean *Job Complexity* = 41.9%, the number of unique industries (two digit SIC) that an audit office covers, scaled by the total number of clients). The median home price for

[16] As indicated previously, since our H-1B visa data is most available for lower level employees, there is data available for fewer states as the rank of the salary increases.

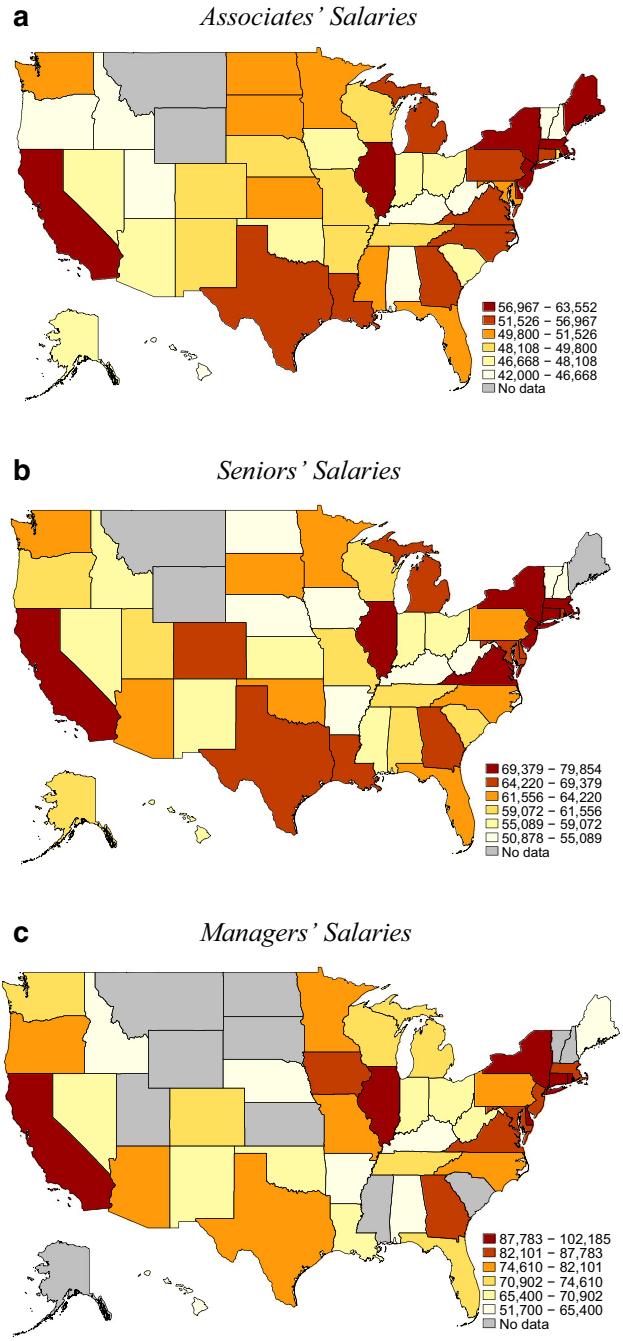

Fig. 2 Geographic variation in auditors' salaries. This figure displays audit salaries across the United States from 2004 to 2013, based on data obtained from H-1B visa applications

Table 3 Descriptive statistics main sample

Panel A: Main sample ($n = 12{,}796$)

Variables	Mean	25%	Median	75%	SD
MISSTATE%	0.092	0.043	0.078	0.130	0.078
LNFEES	14.190	13.940	14.230	14.391	0.402
LNSALARY	11.045	10.837	10.985	11.212	0.284
LNSALARY_ASC	10.884	10.758	10.849	10.951	0.191
LNSALARY_SNR	11.144	10.968	11.091	11.278	0.258
LNSALARY_MGR	11.337	11.164	11.314	11.493	0.257
LNALTΔ	−0.225	−0.409	−0.265	−0.079	0.251
LNALTΔ_ASC	−0.375	−0.487	−0.392	−0.283	0.165
LNALTΔ_SNR	−0.140	−0.288	−0.177	−0.019	0.220
LNALTΔ_MGR	0.039	−0.121	0.041	0.209	0.233
AUDMKTSHR	0.231	0.149	0.209	0.282	0.120
JOBCOMPLX	0.419	0.343	0.424	0.500	0.121
Home Price	523,339	194,922	493,183	863,450	335,679
Population	2,897,651	575,816	1,228,613	3,878,725	3,183,196
EDUCATION	0.146	0.113	0.153	0.153	0.035
LNASSETS	7.180	6.651	7.311	7.678	0.750
MW	0.152	0.077	0.138	0.205	0.109
LEVERAGE	0.605	0.547	0.602	0.663	0.108
QRATIO	2.448	1.620	2.061	2.602	1.836
ROA	0.002	−0.032	0.009	0.035	0.101
LOSS	0.285	0.188	0.267	0.366	0.142
FNDSRED	0.244	0.160	0.235	0.313	0.123
ACQESS	0.031	0.000	0.024	0.048	0.040
MTB	1.840	1.023	1.783	2.378	5.871
IINTCOV	0.106	0.069	0.152	0.214	0.257
LNBSEG	1.098	1.011	1.096	1.197	0.155
ARINV	0.250	0.202	0.238	0.292	0.072
FOREIGN	0.273	0.200	0.283	0.333	0.126
AGROWTH	1.986	0.070	0.145	0.281	9.117
MERGER	0.164	0.114	0.154	0.206	0.094
GC	0.024	0.000	0.014	0.032	0.040
YE	0.750	0.692	0.753	0.829	0.129
OP_404b	0.809	0.766	0.833	0.882	0.129
ANCRST	0.081	0.029	0.071	0.111	0.076

The above table provides descriptive statistics for the dependent, independent, and control variables used in the levels analysis. All variables are defined in the appendix Table 10

cities in our sample is $493,183 and the average population is approximately 2.9 million. These figures tend to be above the national averages indicated in census

data, since the audit offices in our sample are located in major metropolitan areas.[17]

4 Determinants of audit personnel salaries

As there is limited empirical research on auditor salaries, we begin our empirical analyses by providing important descriptive evidence on the factors that relate to auditor salaries. This analysis is also valuable to help us determine the explanatory power of control variables used in subsequent regression analyses. We estimate the following regression model with variable definitions found in the appendix Table 10.

$$\begin{aligned} LNSALARY_{i,a,m,t} = {} & \beta_0 + \beta_1 RANK_{i,a,m,t} + \beta_2 JOBCOMPLX_{a,m,t} \\ & + \beta_3 AUDMKTSHR_{a,m,t} + \beta_4 LNHOMEP_{m,t} + \beta_5 LNPOP_{m,t} \\ & + \beta_6 EDUCATION_m + Year\ FE + \varepsilon_{i,a,m,t}, \end{aligned} \quad (1)$$

where *LNSALARY* is the natural log of salary earned by individual *i* employed by audit firm *a* in MSA *m* in year *t*. *RANK* is a variable coded to equal 1 for associate, 2 for senior, and 3 for manager and represents the incremental effect, in logged dollars, of obtaining one higher rank. In this regression, the unit of observation is an individual visa application. Standard errors are clustered by the interaction of audit office and year to account for the fact that each office can have multiple observations in a given year.

We identify office and geographical characteristics that we expect relate to the trade-offs auditors make when accepting a given wage. We include a measure of job complexity (*JOBCOMPLX*) that is the number of unique industries that an audit office covers scaled by total number of clients in an office. If an audit office represents a diverse set of industries, the task of the auditor may be more complex and thus might result in a higher salary to compensate for the complexity. We measure the audit market share (*AUDMKTSHR*) as the fraction of audit fees generated by a given audit office to the total audit fees for the MSA. Individuals might trade off salary for the opportunity to work at a leading audit firm (i.e., high market share) if they obtain better skills or experience, leading to better future career prospects. Alternatively, firms with higher audit market share could pay higher audit salaries to maintain their competitive advantage and hire and retain better personnel.

We include three MSA characteristics that are likely to influence audit personnel salaries in a particular city. Individuals may demand higher salary to compensate for working in MSAs with high cost of living or highly populated regions. We measure the cost of living using the natural log of the MSA median home price (*LNHOMEP*) obtained from Zillow. We measure city size as the natural log of the number of people residing in a given MSA (*LNPOP*). Finally, we include the level of education in an MSA (*EDUCATION*) as a proxy for the level of human capital in a city. *EDUCATION* is measured as the percentage of the population with graduate degrees (Beck et al. 2017). Individuals with more human capital may demand higher salaries to compensate

[17] See, for example, https://www.census.gov/construction/nrs/pdf/uspricemon.pdf.

for their initial investment in human capital, thus resulting in a positive correlation between education and salary.

Table 4 reports the results of the salary determinants analysis. In Column 1, we present the baseline results that only include *RANK*, MSA fixed effects, and year fixed effects. Not surprisingly, *RANK* is positively and significantly correlated with *LNSALARY* ($p < 0.01$). The results of this analysis also suggest that rank, year, and MSA fixed effects explain a substantial portion of the variation in audit personnel salary, as the model indicates an R-squared of 57.1%.

While Column 1 demonstrates that city characteristics generally explain a substantial portion of the variation in audit personnel salary, it is limited in that it provides little insight as to which characteristics matter. Accordingly, in Column 2, we estimate Eq. 1 without MSA fixed effects to provide more insight into which observable characteristics explain cross-sectional variation in audit personnel salaries. Regarding audit-office characteristics, we find a positive and significant coefficient on *JOBCOMPLX* ($p < 0.01$), consistent with audit personnel receiving higher salaries when they are at offices with more diverse client populations. We also find a negative and significant coefficient on *AUDMKTSHR* ($p < 0.01$), consistent with audit market leaders paying lower salaries, possibly due to the audit personnel being willing to trade off salary for the benefits of working for the market leader. We also find that characteristics of the region relate to the level of salary. Regions with higher home prices and higher population are associated with higher levels of salary, as evidenced by positive and significant coefficients on *LNHOMEP* and *LNPOP* ($p < 0.01$), respectively. Moreover, consistent with human capital being an important factor in the auditing industry (Beck et al. 2017), we find a positive and significant coefficient on *EDUCATION* ($p < 0.01$). In Column 3, we disaggregate *RANK* into indicators for senior and manager. This analysis indicates that seniors earn more than associates (coefficient = 0.2396) and managers earn more than seniors and associates (coefficient = 0.4223), as should be expected.

In Panel B of Table 4, we re-estimate the determinants analysis for the associate, senior, and manager subsamples in Columns 1, 2, and 3, respectively. We find that job complexity, audit market share, and cost of living are all significant determinants of audit personnel salaries across the three ranks. We also note some interesting differences across the groups. First, associate salaries appear to be most sensitive to the size of the city, as the coefficient on *LNPOP* is only significant in this subgroup. Second, the positive association between *EDUCATION* and salary appears to be more pronounced in lower-level labor, as it monotonically decreases as we move from associates (coefficient = 0.7264, $p < 0.01$) to seniors (coefficient = 0.6403, $p < 0.05$) to managers (coefficient = 0.3075, $p > 0.10$). This suggests that the payoff for higher investments in human capital are most pronounced in the early stages of an auditor's career. Third, the relationships between audit personnel salary and job complexity and audit market share vary monotonically from lower to higher ranked employees.

While the above analyses provide interesting insights regarding the relationship between audit personnel salary and MSA and office characteristics, note that they are descriptive and do not explain the underlying mechanisms. For example, the positive and significant association between job complexity and audit personnel salaries

Table 4 Characteristics associated with auditor salary (DV = *LNSALARY*)

	Pred. Sign	(1) Coef. (t-stat)	(2) Coef. (t-stat)	(3) Coef. (t-stat)
Panel A: Full sample				
RANK	+	0.2142***	0.2181***	
		(39.05)	(41.09)	
SENIOR	+			0.2396***
				(27.46)
MANAGER	+			0.4223***
				(44.0)
JOBCOMPLX	+		0.1680***	0.1663***
			(4.92)	(4.89)
AUDMKTSHR	±		−0.1857***	−0.1837***
			(−4.95)	(−4.92)
LNHOMEP	+		0.0738***	0.0734***
			(10.88)	(10.71)
LNPOP	+		0.0145***	0.0145***
			(4.07)	(4.09)
EDUCATION	+		0.6047***	0.6158***
			(4.04)	(4.10)
Intercept		10.5729***	9.4184***	9.6343***
		(196.35)	(103.39)	(104.49)
MSA FE		Yes	No	No
Year FE		Yes	Yes	Yes
Observations		12,796	12,796	12,796
R^2		0.571	0.559	0.561
Panel B: By auditor rank				
JOBCOMPLX	+	0.1240***	0.1750***	0.2830***
		(3.86)	(3.68)	(3.15)
AUDMKTSHR	±	−0.1087***	−0.2091***	−0.4200***
		(−3.02)	(−3.90)	(−4.09)
LNHOMEP	+	0.0644***	0.0853***	0.0695***
		(7.08)	(10.03)	(5.53)
LNPOP	+	0.0206***	0.0105	0.0088
		(6.79)	(1.98)	(1.42)
EDUCATION	+	0.7264***	0.6403**	0.3075
		(4.92)	(2.68)	(1.31)
Intercept		9.6469***	9.7769***	10.2481***
		(83.86)	(90.06)	(54.95)
Year FE		Yes	Yes	Yes
Observations		6237	4698	1861
R^2		0.411	0.301	0.251

*, **, ***: $p < 0.10$, $p < 0.05$, $p < 0.01$, respectively, two-tailed tests. Standard errors are clustered by audit-office interacted with year to compute t-statistics. Variable definitions can be found in the appendix Table 10. The sample period includes years 2004 to 2013

indicated in Panel A of Table 4 might represent audit firms providing extra compensation for auditors who work in complex environments or firms providing additional compensation to draw talented candidates who are better able to work in complex environments. Nevertheless, these results provide the audit literature with some of the first evidence regarding the factors associated with audit personnel salaries.

5 Audit personnel salaries and audit quality

5.1 Relation between audit personnel salaries and audit quality

We next test H1, which examines the relation between audit personnel salaries and audit quality. To test H1, we estimate the following regression model with variable definitions found in the appendix Table 10.

$$\begin{aligned} MISSTATE\%_{a,m,t} = {} & \beta_0 + \beta_1 LNSALARY|LNALT\Delta_{i,a,m,t} + \beta_2 LNASSETS_{a,m,t} \\ & + \beta_3 MW_{a,m,t} + \beta_4 LEVERAGE_{a,m,t} + \beta_5 QRATIO_{a,m,t} \\ & + \beta_6 ROA_{a,m,t} + \beta_7 LNFEES_{a,m,t} + \beta_8 LOSS_{a,m,t} \\ & + \beta_9 FNDSRSED_{a,m,t} + \beta_{10} MERGER_{a,m,t} + \beta_{11} MTB_{a,m,t} \\ & + \beta_{12} IINTCOV_{a,m,t} + \beta_{13} JOBCOMPLX_{a,m,t} \\ & + \beta_{14} AUDMKTSHR_{a,m,t} + \beta_{15} LNHOMEP_{m,t} + \beta_{16} LNPOP_{m,t} \\ & + \beta_{17} EDUCATION_m + Rank\ \ FE + Year\ Fixed\ Effects \\ & + \varepsilon_{i,a,m,t}. \end{aligned} \tag{2}$$

We measure MSA audit office quality using the percentage of clients within the client portfolio in a given year that will release financial statements that contain a misstatement (*MISSTATE%*), which will be restated in future periods. Misstatements strongly indicate poor audit quality, as they represent instances where the auditor issued an unqualified opinion on misstated financial statements (DeFond and Zhang 2014). Furthermore, survey evidence indicates that partners believe financial statement restatements to be a key indicator of low audit quality (e.g., Christensen et al. 2015), and Aobdia (2016) validates the measure using PCAOB inspection finding results. To the extent audit salaries attract and retain high quality personnel and this leads to better outcomes, we expect a negative coefficient on *LNSALARY*. However, to the extent salary is not a key driver of audit office quality, we may find either a positive or nonsignificant relationship.

We include a number of control variables that have been shown in the literature to indicate restatements (e.g., Palmrose et al. 2004; Ettredge et al. 2011; Blankley et al. 2012; Files et al. 2013; Boland et al. 2015). All control variables in this analysis are computed as the average value of their respective measures across of all clients within the given audit office in the MSA in a year. We include *LNASSETS* to control for the client's size and include *LOSS* and *ROA* to control for financial performance as poor performing

firms have an incentive to boost their current year financial performance resulting in an increased likelihood of misstatement. As capital market pressures and M&A accounting, respectively, are associated with increased likelihood of restatement, we include measures that captures the need for financing (*FNDSRED*) and merger and acquisition activity (*MERGER*). We include the market-to-book ratio to control for growth. We include the quick ratio (*QRATIO*), inverse interest coverage ratio (*IINTCOV*), and the ratio of total liabilities to total assets (*LEVERAGE*) to control for variation in liquidity. We also include an indicator for the number of material weaknesses in the portfolio, as prior research demonstrates a positive association between internal weaknesses and audit quality. We also include the determinants variables from Eq. 1 shown to relate to audit salaries: *JOBCOMPLEX*, *AUDMKTSHR*, *LNHOMEP*, *LNPOP*, and *EDUCATION*. Finally, we include auditor rank fixed effects and year fixed effects.

Table 5 reports the results from estimating Eq. 2. Each individual observation is an employee wage contract for a given audit firm office in a given year. Standard errors are clustered by the interaction of audit office and year to account for the fact that each office can have multiple observations in a given year. Column 1 presents the results for the full sample of auditor positions (i.e., associates, seniors, and managers). Columns 2 through 4 present the results for associates, seniors, and managers, respectively. The results for the full sample indicate a negative and significant relation between *LNSALARY* and *MISSTATE%*, suggesting that salary is positively correlated with audit quality. The results are economically meaningful. An interquartile shift in the log of salary is associated with a 11.03% reduction in the audit office client portfolio misstatement rate relative to the sample mean. In Columns 2 through 4, we examine each rank separately and find that associate, senior, and manager salaries are all negatively correlated with *MISSTATE%* ($p < 0.01$). Interquartile shifts in salary are associated with 7.23, 6.84, and 14.26% reductions in misstatement rates, relative to the subsample means for the associate, senior, and manager sub-analyses, respectively. Overall, these findings provide evidence to suggest that salary has a positive impact on audit quality, even after controlling for trade-offs individuals make when accepting a given level of wage. These findings are consistent with higher levels of salary attracting (or retaining) more talented auditors.

5.2 Relation between alternative career opportunities and frequency of restatements

Our second hypothesis considers how audit quality varies with the difference in pay between auditors and alternative career opportunities within accounting firms. Specifically, we measure *LNALT*Δ as the natural logarithm of audit personnel salary less the natural logarithm of the average salaries for all Big 4 tax, IT, and consulting professionals in an MSA for a given year. We obtain this alternative career salary data from the H-1B visas, retaining all positions from the Big 4 auditors that are not financial statement auditors and specifically list tax, IT, and consulting. We predict that, as the prevailing wage gap in an office increases, potential audit recruits are more likely to forgo a career in auditing. This would ultimately reduce audit office quality, as evidenced by a negative association between the wage gap and the percentage of clients with a material misstatement restated in future periods. We test this prediction by replacing *LNSALARY* in Eq. (2) with *LNALT*Δ. Table 6 reports the results.

Table 5 Auditor salary and accounting quality (DV = *MISSTATE%*)

		Full sample	Associates	Seniors	Managers
	Pred. Sign	(1) Coef. (t-stat)	(2) Coef. (t-stat)	(3) Coef. (t-stat)	(4) Coef. (t-stat)
LNSALARY	±	**−0.0271*** **	**−0.0345*** **	**−0.0203*** **	**−0.0399*** **
		(−4.10)	**(−3.42)**	**(−3.04)**	**(−3.39)**
LNASSETS		−0.0049	0.0032	−0.0136*	−0.0076
		(−0.73)	(0.44)	(−1.81)	(−0.82)
MW		0.0756***	0.0401	0.0924***	0.1628***
		(2.86)	(1.48)	(2.90)	(2.92)
LEVERAGE		−0.0322	−0.0200	−0.0323	−0.0576
		(−0.90)	(−0.51)	(−0.83)	(−1.49)
QRATIO		−0.0034***	−0.0027***	−0.0043**	−0.0031**
		(−3.08)	(−2.71)	(−2.88)	(−2.28)
ROA		0.0347**	0.0268	0.0451**	0.0276
		(1.97)	(1.47)	(2.11)	(0.92)
LNFEES		0.0195*	0.0078	0.0325**	0.0249
		(1.69)	(0.63)	(2.32)	(1.44)
LOSS		−0.0038	−0.0068	0.0061	−0.0253
		(−0.16)	(−0.26)	(0.23)	(−0.64)
FNDSRED		0.0196	0.0316	0.0199	−0.0206
		(0.96)	(1.33)	(0.93)	(−0.73)
MERGER		0.0050	0.0135	−0.0143	0.0407
		(0.09)	(0.17)	(−0.29)	(0.46)
MTB		−0.0009***	−0.0009***	−0.0009***	−0.0009***
		(−4.14)	(−2.70)	(−4.11)	(−5.12)
IINTCOV		−0.0012	0.0004	0.0038	−0.0154
		(−0.10)	(0.03)	(0.37)	(−0.91)
JOBCOMPLX		0.0198	0.0087	0.0293	0.0390
		(0.92)	(0.34)	(1.32)	(1.25)
AUDMKTSHR		0.0056	0.0101	−0.0016	−0.0015
		(0.23)	(0.38)	(−0.05)	(−0.03)
LNHOMEP		0.0177***	0.0193***	0.0180***	0.0137**
		(3.87)	(3.95)	(3.52)	(2.39)
LNPOP		−0.0049***	−0.0061***	−0.0047**	−0.0022
		(−2.78)	(−2.83)	(−2.54)	(−1.13)
EDUCATION		−0.2964***	−0.2962***	−0.3710***	−0.1861
		(−3.22)	(−2.93)	(−3.86)	(−1.43)
Intercept		0.1096	0.2933	−0.1483	0.1625
		(0.83)	(1.90)	(−0.97)	(0.73)
Rank FE		Yes	N/A	N/A	N/A
Year FE		Yes	Yes	Yes	Yes
Observations		12,796	6237	4698	1861
R^2		0.151	0.142	0.180	0.193

*, **, ***: $p < 0.10$, $p < 0.05$, $p < 0.01$, respectively, two-tailed tests. Standard errors are clustered by audit-office interacted with year to compute t-statistics. Variable definitions can be found in the appendix Table 10. The sample period includes years 2004 to 2013

Table 6 Alternative career opportunities and accounting quality (DV = *MISSTATE%*)

		Full sample	Associates	Seniors	Managers
	Pred. Sign	(1) Coef. (t-stat)	(2) Coef. (t-stat)	(3) Coef. (t-stat)	(4) Coef. (t-stat)
LNALTΔ	–	**−0.0237*** **	**−0.0267*** **	**−0.0203*** **	**−0.0343*** **
		(−3.57)	**(−2.94)**	**(−2.86)**	**(−2.91)**
LNASSETS		−0.0121	−0.0043	−0.0206***	−0.0117
		(−1.56)	(−0.50)	(−2.61)	(−1.15)
MW		0.1294***	0.1095***	0.1450***	0.1482***
		(4.05)	(3.30)	(4.02)	(3.42)
LEVERAGE		−0.0435	−0.0277	−0.0547	−0.0505
		(−1.11)	(−0.63)	(−1.43)	(−1.16)
QRATIO		−0.0037***	−0.0034***	−0.0041***	−0.0030***
		(−3.19)	(−3.15)	(−3.11)	(−2.62)
ROA		0.0251	0.0138	0.0366*	0.0197
		(1.39)	(0.76)	(1.75)	(0.70)
LNFEES		0.0233*	0.0075	0.0433***	0.0216
		(1.71)	(0.52)	(2.97)	(1.15)
LOSS		−0.0449*	−0.0479*	−0.0352	−0.0685*
		(−1.70)	(−1.68)	(−1.19)	(−1.83)
FNDSRED		0.0411*	0.0707	0.0249	−0.0070
		(1.71)	(2.71)	(0.99)	(−0.23)
MERGER		−0.0335	−0.0661	−0.0245	0.0258
		(−0.49)	(−0.76)	(−0.42)	(0.27)
MTB		−0.0010***	−0.0012***	−0.0010***	−0.0009***
		(−3.64)	(−3.37)	(−3.11)	(−3.30)
IINTCOV		−0.0048	−0.0049	−0.0000	−0.0138
		(−0.38)	(−0.38)	(−0.00)	(−0.80)
JOBCOMPLX		0.0185	0.0092	0.0315	0.0172
		(0.80)	(0.38)	(1.31)	(0.51)
AUDMKTSHR		0.0079	0.0276	−0.0130	−0.0115
		(0.26)	(0.90)	(−0.40)	(−0.25)
LNHOMEP		0.0158***	0.0179***	0.0148***	0.0124**
		(3.34)	(3.65)	(2.89)	(2.11)
LNPOP		−0.0042**	−0.0047**	−0.0045**	−0.0017
		(−2.51)	(−2.45)	(−2.59)	(−0.93)
EDUCATION		−0.2954***	−0.2882***	−0.3772***	−0.1572
		(−3.06)	(−2.80)	(−3.84)	(−1.24)
Intercept		−0.2407	−0.1077	−0.4213**	−0.1981
		(−1.63)	(−0.71)	(−2.60)	(−0.93)
Rank FE		Yes	N/A	N/A	N/A
Year FE		Yes	Yes	Yes	Yes
Observations		11,791	5631	4401	1759
R^2		0.198	0.195	0.221	0.201

*, **, ***: $p < 0.10$, $p < 0.05$, $p < 0.01$, respectively, two-tailed tests. Standard errors are clustered by audit-office interacted with year to compute t-statistics. Variable definitions can be found in the appendix Table 10. The sample period includes years 2004 to 2013

Overall, we find that *LNALTΔ* is negatively associated with *MISSTATE%* (Column 1, $p < 0.01$), consistent with audit quality being higher when an audit firm pays auditors closer to (or higher than) the prevailing wage of alternative career opportunities. The results are economically meaningful, as an interquartile shift in the wage gap is associated with a 8.5% reduction in the audit office client portfolio misstatement rate, relative to the sample mean. In Columns 2 through 4, we also find this result is consistent across auditor ranks (*p*-values are less than 0.01 in all cases). Interquartile shifts in salary are associated with 5.92, 5.94, and 12.3% reductions in misstatement rates, relative to the subsample means for the associate, senior, and manager sub-analyses, respectively. These findings suggest that auditor salary and its relation to alternative career opportunities relates to an audit firms' ability to attract higher quality auditor talent.

5.3 Robustness and alternative specifications

We next consider the robustness of our audit quality results across three dimensions. First, we test the robustness of our findings to the inclusion of MSA fixed effects, as time-invariant, unobservable characteristics of an MSA may be correlated with both audit salary and audit quality.[18] Doing so also allows us to better measure the premium paid above the prevailing wage in a given MSA. In our baseline model, we explicitly control for some MSA characteristics (some of which are fixed and which preclude including MSA fixed effects). For example, we follow Beck et al. (2017) and control for education, based on data from the U.S. Census, but this variable is only available for one period in our sample period. The results from Table 4, Panel A, suggest that the MSA characteristics that we explicitly control for explain a significant amount of the variation in salary within our sample. However, it may be the case that our analyses do not control for other relevant MSA characteristics. Accordingly, we re-examine the estimates in Tables 5 and 6 after including MSA fixed effects. Table 7, Panels A and B, presents the results for audit salary (*LNSALARY*) and relative audit salary (*LNALTΔ*) with MSA fixed effects. The results from these tests are similar to those in Tables 5 and 6, in both economic and statistical magnitude, and confirm our previous results.

We further consider the robustness of our results to the inclusion of MSA x Year fixed effects to consider whether our results are confounded by unobservable time-varying characteristics of MSAs. This specification is particularly important because the resulting regression coefficients are identified based on variation across audit firms within a particular MSA and year combination, which helps alleviate concerns about differences across time and across geographic locations. Panels C and D of Table 7 report these results. Consistent with the previous results, we continue to find evidence of similar magnitude and statistical significance after augmenting our models with MSA x Year fixed effects.

Our second robustness test considers misstatements that are material and immaterial to the fiscal period in question. Material error corrections (i.e., Big R restatements) require an 8-K item 4.02 disclosure and a restated set of financial statements, whereas

[18] As an additional specification, we also include auditor fixed effects in lieu of MSA fixed effects to hold time-invariant characteristics of the Big 4 audit firms constant. We find qualitatively similar results to what is reported in Tables 5 and 6.

Table 7 Audit quality robustness analyses (DV = *MISSTATE%*)

		Full sample	Associates	Seniors	Managers
	Pred. Sign	(1) Coef. (t-stat)	(2) Coef. (t-stat)	(3) Coef. (t-stat)	(4) Coef. (t-stat)
Panel A: Audit salary and audit quality with metropolitan statistical area fixed effects					
LNSALARY	±	**−0.0239*** **	**−0.0343*** **	**−0.0194*** **	**−0.0299*** **
		(−3.83)	**(−3.71)**	**(−3.04)**	**(−2.77)**
Controls		Yes	Yes	Yes	Yes
MSA FE		Yes	Yes	Yes	Yes
Rank FE		Yes	N/A	N/A	N/A
Year FE		Yes	Yes	Yes	Yes
Observations		12,796	6237	4698	1861
R^2		0.255	0.286	0.284	0.388
Panel B: Alternative careers and audit quality with metropolitan statistical area fixed effects					
***LNALT*Δ**	–	**−0.0219*** **	**−0.0294*** **	**−0.0163** **	**−0.0276** **
		(−3.46)	**(−3.32)**	**(−2.36)**	**(−2.56)**
Controls		Yes	Yes	Yes	Yes
MSA FE		Yes	Yes	Yes	Yes
Rank FE		Yes	N/A	N/A	N/A
Year FE		Yes	Yes	Yes	Yes
Observations		11,791	5631	4401	1759
R^2		0.275	0.271	0.314	0.342
Panel C: Audit salary and audit quality with metropolitan statistical area-year fixed effects					
LNSALARY	±	**−0.0192*** **	**−0.0306*** **	**−0.0125** **	**−0.0240*** **
		(−3.49)	**(−4.11)**	**(−2.05)**	**(−2.37)**
Controls		Yes	Yes	Yes	Yes
MSA-Year FE		Yes	Yes	Yes	Yes
Rank FE		Yes	N/A	N/A	N/A
Year FE		Yes	Yes	Yes	Yes
Observations		12,796	6237	4698	1861
R^2		0.549	0.601	0.573	0.694
Panel D: Alternative careers and audit quality with metropolitan statistical area-year fixed effects					
***LNALT*Δ**	–	**−0.0184*** **	**−0.0279*** **	**−0.0136** **	**−0.0241** **
		(−3.20)	**(−3.80)**	**(−2.11)**	**(−2.34)**
Controls		Yes	Yes	Yes	Yes
MSA-Year FE		Yes	Yes	Yes	Yes
Rank FE		Yes	N/A	N/A	N/A
Observations		11,791	5631	4401	1759
R^2		0.462	0.483	0.510	0.622

*, **, ***: $p < 0.10$, $p < 0.05$, $p < 0.01$, respectively, two-tailed tests. Standard errors are clustered by audit-office interacted with year to compute t-statistics. Variable definitions can be found in the appendix Table 10. The sample period includes years 2004 to 2013

immaterial error corrections made via revisions (i.e., little r restatement) do not require these disclosures. We run the analyses separately for both the salary and the consulting delta analyses for the primary sample, rank level subsamples, and for the MSA and MSA x Year fixed effect specifications. We find qualitatively similar results for what is reported in Tables 5, 6, and 7. Thus we find that audit salary relates to the likelihood of both large and small misstatements, both of which have been found to predict significant financial report problems in the future (e.g., Choudhary et al. 2016).

Our third robustness test varies the sample and aggregation of both restatement frequency (i.e., the dependent variable) and the audit personnel salary measures (i.e., the independent variables *LNSALARY* and *LNALT*Δ). Our analyses in Tables 5 and 6 consider a regression of audit-office-level restatement frequency on individual audit-office salaries, clustering on audit-office interacted with year fixed effects to adjust for correlation between errors within an audit-office-year. Since the independent variable in the baseline model is measured at the audit-personnel level, our baseline has the benefit of allowing us to partition our sample by rank (i.e., associate, senior, and manager). Furthermore, the baseline model is a natural extension of the determinants analysis in Table 4, which examines the economic factors associated with individual auditor's salary. Nevertheless, the aggregation used in the this model might introduce bias into the coefficient estimates if, for example, offices in which there are more auditors are systematically different from other offices and these offices are overrepresented in our sample.[19]

Accordingly, we consider two alternative specifications to our audit quality model. First, we aggregate the data to the audit-office level, conducting the analysis separately for each rank. In this specification, *LNSALARY* represents the average of the natural log of salary for associates, seniors, and managers, respectively, at the MSA audit office level. *LNALT*Δ is calculated similarly. Table 8, Panels A through C, present regressions of audit office restatement frequency on average audit-office salary by rank (i.e., associate, senior, and manager). Columns 1 and 4 of each panel present regression results excluding MSA fixed effects, Columns 2 and 5 include MSA fixed effects, and Columns 3 and 6 include MSA x Year fixed effects. Sample sizes vary due to variation in the number of offices with audit personnel in the various ranks. In Panel A (associates), the coefficients on *LNSALARY* (Columns 1 to 3) and *LNALT*Δ (Columns 4 to 6) are all negative and significant, consistent with our previously reported results. In Panel B (seniors), most of the coefficients are negative, but only the coefficient on *LNSALARY* in Column 2 is significant ($p < 0.10$). In Panel C (managers), the coefficients on *LNSALARY* (Columns 1 to 3) and *LNALT*Δ (Columns 4 to 6) are all negative and significant. Overall, our results are largely robust to aggregation at the MSA audit office level.

Our second aggregation robustness test considers potential bias in the audit-office level restatement frequency variable (i.e., dependent variable) and aggregated audit-office level controls. We disaggregate these measures and examine firm-level regressions of restatement occurrence on the average audit-office salary variables from above and include firm-level controls (instead of office-level controls). This allows more

[19] We also alleviate this concern by dropping the most populous city, New York, and find our results are robust. Another way to understand this concern is that how the analysis is currently conducted is equivalent to value weighting the cities by the number of visas (which, if visa applications are constant as a percentage of the population across cities, reflects the economic reality of the importance of those cities). Condensing each city down to a single observation per firm/year is equivalent to equal weighting observations, so that the Boise office of EY can influence the estimates as much as the New York City office can.

Table 8 Quality analysis alternative aggregation levels (DV = *MISSTATE%*)

	Pred. Sign	(1) Coef. (t-stat)	(2) Coef. (t-stat)	(3) Coef. (t-stat)	(4) Coef. (t-stat)	(5) Coef. (t-stat)	(6) Coef. (t-stat)
Panel A: Aggregation at the MSA audit office level (associates)							
LNSALARY	±	**−0.0749****	**−0.0923*****	**−0.1396*****			
		(−2.01)	**(−2.76)**	**(−2.81)**			
***LNALT*Δ**	–				**−0.058****	**−0.0711****	**−0.1344****
					(−2.02)	**(−2.48)**	**(−2.55)**
Controls		Yes	Yes	Yes	Yes	Yes	Yes
MSA FE		No	Yes	No	No	Yes	No
Year FE		Yes	Yes	No	Yes	Yes	No
MSA-Year FE		No	No	Yes	No	No	Yes
Observations		1292	1292	1292	878	878	878
Adjusted R^2		0.086	0.258	0.648	0.131	0.232	0.446
Panel B: Aggregation at the MSA audit office level (seniors)							
LNSALARY	±	**−0.0190**	**−0.0359***	**0.0002**			
		(−0.97)	**(−1.86)**	**(0.01)**			
***LNALT*Δ**	–				**−0.0238**	**−0.0213**	**0.0035**
					(−1.13)	**(−1.00)**	**(0.11)**
Controls		Yes	Yes	Yes	Yes	Yes	Yes
MSA FE		No	Yes	No	No	Yes	No
Year FE		Yes	Yes	No	Yes	Yes	No
MSA-Year FE		No	No	Yes	No	No	Yes
Observations		972	972	972	735	735	735
Adjusted R^2		0.112	0.246	0.628	0.170	0.297	0.519

Table 8 (continued)

	Pred. Sign	(1) Coef. (t-stat)	(2) Coef. (t-stat)	(3) Coef. (t-stat)	(4) Coef. (t-stat)	(5) Coef. (t-stat)	(6) Coef. (t-stat)
Panel C: Aggregation at the MSA audit office level (managers)							
LNSALARY	±	**−0.0780*** **	**−0.0710*** **	**−0.0643** **			
		(−3.85)	**(−3.41)**	**(−1.98)**			
***LNALT*Δ**	–				**−0.0738*** **	**−0.0715*** **	**−0.0664** **
					(−3.79)	**(−3.50)**	**(−2.10)**
Controls		Yes	Yes	Yes	Yes	Yes	Yes
MSA FE		No	Yes	No	No	Yes	No
Year FE		Yes	Yes	No	Yes	Yes	No
MSA-Year FE		No	No	Yes	No	No	Yes
Observations		589	589	589	488	488	488
Adjusted R^2		0.176	0.428	0.754	0.175	0.321	0.629
Panel D: Aggregation at the client level (associates)							
LNSALARY	±	**−0.0407***	**−0.0416***	**−0.0898*** **			
		(−1.66)	**(−1.67)**	**(−3.04)**			
***LNALT*Δ**	–				**−0.0492** **	**−0.0336**	**−0.0859*** **
					(−2.04)	**(−1.37)**	**(−2.69)**
Controls & Industry FE		Yes	Yes	Yes	Yes	Yes	Yes
MSA FE		No	Yes	No	No	Yes	No
Year FE		Yes	Yes	No	Yes	Yes	No
MSA-Year FE		No	No	Yes	No	No	Yes
Observations		18,538	18,538	18,538	16,362	16,362	16,362
Adjusted R^2		0.048	0.057	0.082	0.051	0.056	0.072
Panel E: Aggregation at the client level (seniors)							
LNSALARY	±	**−0.0266**	**−0.0332** **	**−0.0129**			

Table 8 (continued)

	Pred. Sign	(1) Coef. (t-stat)	(2) Coef. (t-stat)	(3) Coef. (t-stat)	(4) Coef. (t-stat)	(5) Coef. (t-stat)	(6) Coef. (t-stat)
		(−1.63)	**(−2.05)**	**(−0.66)**			
LNALTΔ	–				**−0.0360****	**−0.0296***	**−0.0150**
					(−2.15)	**(−1.81)**	**(−0.76)**
Controls & Industry FE		Yes	Yes	Yes	Yes	Yes	Yes
MSA FE		No	Yes	No	No	Yes	No
Year FE		Yes	Yes	No	Yes	Yes	No
MSA-Year FE		No	No	Yes	No	No	Yes
Observations		16,034	16,034	16,034	14,782	14,782	14,782
Adjusted R^2		0.050	0.057	0.078	0.051	0.056	0.071
Panel F: Aggregation at the client level (managers)							
LNSALARY	±	**−0.0662*****	**−0.0625*****	**−0.0646****			
		(−3.17)	**(−2.98)**	**(−2.43)**			
LNALTΔ	–				**−0.0675*****	**−0.0627*****	**−0.0668****
					(−3.34)	**(−3.10)**	**(−2.52)**
Controls & Industry FE		Yes	Yes	Yes	Yes	Yes	Yes
MSA FE		No	Yes	No	No	Yes	No
Year FE		Yes	Yes	No	Yes	Yes	No
MSA-Year FE		No	No	Yes	No	No	Yes
Observations		11,293	11,293	11,293	10,852	10,852	10,852
Adjusted R^2		0.051	0.061	0.079	0.053	0.060	0.075

*, **, ***: $p < 0.10$, $p < 0.05$, $p < 0.01$, respectively, two-tailed tests. Standard errors are clustered by audit office interacted with year to compute t-statistics. Variable definitions can be found in the appendix Table 10. The sample period includes years 2004 to 2013. Panel A aggregates at the MSA audit-office level, while Panel B aggregates at the client level

precision in the inclusion of controls (as we can include firm-level controls) and the calculation of the dependent variable but less precision in the salary measures (as a given firm audited by a given office might not have a specific rank of auditor on the team, especially a rank with the observed salary). Table 8, Panels D through F, provide the results from this analysis. Columns 1 and 4 of each panel present regression results excluding MSA fixed effects, Columns 2 and 5 include MSA fixed effects, and Columns 3 and 6 include MSA x Year fixed effects.

In Panel D (associates), we find that most of the coefficients on *LNSALARY* and *LNALT*Δ are negative and significant, with most *p*-values ranging from less than 0.10 to less than 0.01. In Panel E (seniors), we find results similar to those in Table 8, Panel B, in that coefficients are negative but not always statistically significant. Finally, in Panel F, we find that all of the coefficients on *LNSALARY* and *LNALT*Δ are negative and significant ($p < 0.05$ or less). Overall, the evidence in Table 8 suggests that our main results are generally robust to differences in aggregation.

5.4 Validation with college placement data

In untabulated analyses, we also corroborate our data using undergraduate/graduate placement data from 2004 to 2013 from three nationally recognized accounting programs.[20] We find similar starting salaries and trends for associate/staff levels at the Big 4 firms using the university placement data. In addition, the university data also suggests that there is a large degree of heterogeneity in starting salaries for graduates of the same accounting program. For example, in one single public school from which we obtain data in a single year, graduates placing at Big 4 accounting firms in auditing positions earned between $42,000 and $57,000 (a 36% difference in compensation)—a difference driven only by auditor office. To provide further confidence of the link between audit personnel salaries and office-level audit quality, we reconstruct the *LNSALARY* measures using the placement data for those entering an audit career at the Big 4 firms. We caution that this analysis is very limited, as we only have 1087 observations available for this analysis, across a 10-year sample period. However, even within this limited sample, we continue to find a negative and significant coefficient on *LNSALARY* (coef. = −0.0775; t-stat = −1.73; p-value = 0.083). Thus we continue to find support for H1, as there is a positive association between audit personnel salaries and audit quality in this reduced sample.

5.5 Results using alternative audit quality measure

We also perform an additional analysis replacing misstatements with a measure of discretionary accruals at the individual salary-aggregation level. We calculate discretionary accruals at the audit client/year level, consistent with Schroeder and Shepardson (2016).[21] We then standardize the measure before creating the MSA audit office

[20] All three programs rank in the top 15 in the Public Accounting Report ranking of master of accounting programs in 2015.

[21] Discretionary accruals is the absolute value of the firm-year residual from a regression of working capital accruals using a modified Jones model that controls for performance, growth, lagged accruals, and nonlinear effects of positive and negative cash flows from operations, estimated for each industry-year with at least 20 observations.

aggregation measures. Specifically, we rank each observation's discretionary accrual measure into quintiles by two-digit SIC code and fiscal year. We then take the average of the rank values for each MSA audit office (*ADAC_RAVG*). This approach allows for the measure to capture how many clients in a given audit office are in the higher versus lower quintiles and account for variation in the industries audited by different offices. The second-stage model includes the salary test variables, MSA controls, and a set of controls that are common in discretionary accrual studies. Below is the model specification with variable definitions in the appendix Table 10.

$$\begin{aligned} ADAC\_RAVG_{a,m,t} = {} & \beta_0 + \beta_1 LNSALARY|LNALT\Delta_{i,a,m,t} + \beta_2 LNASSETS_{a,m,t} \\ & + \beta_3 PPEGROWTH_{a,m,t} + \beta_4 SGROWTH_{a,m,t} + \beta_5 MTB_{a,m,t} \\ & + \beta_6 STD\_SALES_{a,m,t} + \beta_7 STKRET_{a,m,t} + \beta_8 CFO_{a,m,t} \\ & + \beta_9 STD\_CFO_{a,m,t} + \beta_{10} LOSS_{a,m,t} + \beta_{11} LEVERAGE_{a,m,t} \\ & + \beta_{12} ZMIJ\_SHUM_{a,m,t} + \beta_{13} LNBSEG_{a,m,t} \\ & + \beta_{14} FOREIGN_{a,m,t} + \beta_{15} OPCYCLE_{a,m,t} + \beta_{16} LIT_{a,m,t} \\ & + \beta_{17} PYTACC_{a,m,t} + \beta_{18} JOBCOMPLX_{a,m,t} \\ & + \beta_{19} AUDMKTSHR_{a,m,t} + \beta_{20} LNHOMEP_{m,t} \\ & + \beta_{21} LNPOP_{m,t} + \beta_{22} EDUCATION_m + Rank\ FE \\ & + Year\ Fixed\ Effects + \varepsilon_{i,a,m,t}. \end{aligned} \tag{3}$$

In untabulated results, we find the coefficient signs on *LNSALARY* are all negative, consistent with higher salaries being associated with lower discretionary accruals (i.e., higher audit quality). The coefficient for the overall sample is marginally significant ($p = 0.146$), and the coefficient for the associate sample is highly significant ($p = 0.019$). The coefficients for the senior and manager subsamples are not statistically significant. Regarding the wage gap analysis, we find negative coefficients on *LNALT*Δ in all samples, with significant coefficients for the overall ($p = 0.061$) and the associate ($p < 0.01$) samples. This is consistent with audit quality suffering as the wage gap widens.

6 Additional analyses: audit personnel salary and audit fees

Our primary findings indicate that there is significant variation in salary across Big 4 auditors and that this variation can impact accounting quality. A natural follow-up question is whether audit firms can pass on increases in the cost of labor to their clients by increasing audit fees. Although a profit-maximizing audit firm should, in theory, try to increase audit fees (i.e., revenues) as salaries (i.e., costs) increase, it is not clear how price elastic the market for audits is—in other words, whether clients will be willing to accept increased costs of labor beyond some industry benchmark. On the one hand, clients may derive benefit from (or even demand) auditors to pay higher wages, as they believe this will result in better audits. This possibility is consistent with studies that demonstrate that

management, boards of directors, and external providers of capital value high quality audits (Minnis 2011). Thus audit personnel salaries may be positively correlated with audit fees if auditors can pass on the increased cost of labor to their clients.

On the other hand, recent empirical evidence suggests that the audit industry is becoming more competitive and commoditized (IFIAR 2014). The evidence suggests that audit fees are highly price elastic and clients may be unwilling to bear increased costs of labor as second-tier audit firms, such as Grant Thornton and BDO, become viable substitutes for Big 4 auditors (IFIAR 2014) and the costs of switching declines. Indeed, anecdotal evidence suggests that audit fees have grown at a relatively slow pace in recent years, while audit costs are likely to have increased, due to increased regulatory requirements imposed by the PCAOB (Ettredge et al. 2008; Krishnan and Yang 2009; Reason 2010; Bronson et al. 2011). In addition, audit firms are placing significant emphasis on their consulting and advisory services, consistent with their clients placing less value on high quality audits and audit firms seeking alternative sources of profit. Thus whether and to what extent audit salary impacts audit fees beyond client characteristics and industry circumstance is an empirical question.

To examine the effects of salary on audit fees, we estimate the following regression model with variable definitions in the appendix Table 10.

$$\begin{aligned} LNFEES_{a,m,t} = {} & \beta_0 + \beta_1 LNSALARY_{i,a,m,t} + \beta_2 LNASSETS_{a,m,t} + \beta_3 LNBSEG_{a,m,t} \\ & + \beta_4 ARINV_{a,m,t} + \beta_5 FOREIGN_{a,m,t} + \beta_6 LEVERAGE_{a,m,t} \\ & + \beta_7 QRATIO_{a,m,t} + \beta_8 ROA_{a,m,t} + \beta_9 AGROWTH_{a,m,t} \\ & + \beta_{10} MERGER_{a,m,t} + \beta_{11} LOSS_{a,m,t} + \beta_{12} GC_{a,m,t} + \beta_{13} YE_{a,m,t} \\ & + \beta_{14} OP\_404b_{a,m,t} + \beta_{15} MW_{a,m,t} + \beta_{16} ANCRST_{a,m,t} \\ & + \beta_{17} JOBCOMPLX_{a,m,t} + \beta_{18} AUDMKTSHR_{a,m,t} \\ & + \beta_{19} LNHOMEP_{m,t} + \beta_{20} LNPOP_{m,t} + \beta_{21} EDUCATION_m \\ & + Rank\ FE + Year\ Fixed\ Effects + \varepsilon_{i,a,m,t}, \end{aligned} \tag{4}$$

where *LNFEES* is the natural log of office level audit fees. To the extent audit firms can pass along higher salaries to their clients, we expect *LNSALARY* to be positive. We include a set of control variables that are common in the audit fee literature to control for size, complexity, and risk (e.g., Hay et al. 2006). We also include the determinants variables from Eq. 1 shown to relate to audit salaries: *JOBCOMPLEX*, *AUDMKTSHR*, *LNHOMEP*, *LNPOP*, and *EDUCATION*. Finally, we include auditor rank fixed effects and year fixed effects.

Panel A of Table 9 reports the results from estimating Eq. 3. Column 1 provides the results for the full sample. Column 2–4 present the results for associates, seniors, and managers, respectively. The coefficient on *LNSALARY* is positive and significant for the full sample in Column 1 ($p < 0.05$), indicating that higher salaries are associated with higher fees. This finding is consistent with audit firms passing on some portion of the higher cost of labor to their clients. The results in the

Table 9 Auditor salary and accounting fees passed on to client (DV = *LNFEES*)

		Full sample	Associates	Seniors	Managers
	Pred. Sign	(1) Coef. (t-stat)	(2) Coef. (t-stat)	(3) Coef. (t-stat)	(4) Coef. (t-stat)
Panel A. Main analysis					
LNSALARY	±	**0.0334****	**0.0848*****	**0.0296***	**−0.0249**
		(1.96)	**(3.24)**	**(1.69)**	**(−0.87)**
LNASSETS		0.4032***	0.3949***	0.4104***	0.4139***
		(28.56)	(25.24)	(26.12)	(20.53)
LNBSEG		0.2759***	0.2560***	0.3072***	0.2268***
		(5.34)	(4.22)	(5.29)	(2.83)
ARINV		−0.6070***	−0.5029***	−0.7006***	−0.7148***
		(−6.16)	(−4.67)	(−6.34)	(−5.18)
FOREIGN		0.6374***	0.5853***	0.7000***	0.6966***
		(10.07)	(8.45)	(10.40)	(8.76)
LEVERAGE		0.0105	0.0400	−0.0379	0.0991
		(0.14)	(0.44)	(−0.52)	(0.89)
QRATIO		−0.0055**	−0.0041	−0.0073**	−0.0063**
		(−2.08)	(−1.59)	(−2.20)	(−2.08)
ROA		0.0895*	0.0311	0.1496***	0.1077
		(1.84)	(0.56)	(3.03)	(1.67)*
AGROWTH		−0.0003	−0.0006	−0.0002	0.0000
		(−0.57)	(−1.24)	(−0.19)	(0.02)
MERGER		0.2702***	0.3048***	0.2516***	0.1909*
		(3.78)	(3.89)	(3.25)	(1.69)
LOSS		0.3403***	0.3044***	0.3748***	0.3981***
		(5.73)	(4.21)	(5.86)	(4.25)
GC		0.0367	−0.0625	0.2566	0.0479
		(0.25)	(−0.40)	(1.44)	(0.19)
YE		−0.2639***	−0.1760**	−0.3444***	−0.4320***
		(−4.38)	(−2.60)	(−5.17)	(−5.48)
OP_404b		0.3740***	0.3898***	0.3705***	0.3797***
		(5.40)	(4.51)	(5.30)	(3.98)
MW		0.2741***	0.3009***	0.2828***	0.1852*
		(3.60)	(2.99)	(3.81)	(1.84)
ANCRST		0.0551	−0.0097	0.0791	0.1783
		(0.62)	(−0.10)	(0.77)	(1.29)
JOBCOMPLX		−0.3700***	−0.4143***	−0.3215***	−0.3358***
		(−6.74)	(−6.63)	(−5.80)	(−4.32)
AUDMKTSHR		0.3858***	0.3269***	0.4282***	0.5178***
		(7.78)	(6.16)	(7.16)	(5.59)
LNHOMEP		0.0727***	0.0674***	0.0734***	0.0865***

Table 9 (continued)

		Full sample	Associates	Seniors	Managers
	Pred. Sign	(1) Coef. (t-stat)	(2) Coef. (t-stat)	(3) Coef. (t-stat)	(4) Coef. (t-stat)
		(6.77)	(6.09)	(6.39)	(6.50)
LNPOP		0.0157***	0.0183***	0.0143***	0.126**
		(3.07)	(3.04)	(2.72)	(2.33)
EDUCATION		1.8404***	1.9637***	1.7002***	1.3190***
		(6.65)	(6.53)	(6.10)	(3.96)
Intercept		8.9078***	8.3505***	8.9515***	9.4662***
		(41.91)	(29.44)	(36.56)	(28.26)
Rank FE		Yes	N/A	N/A	N/A
Year FE		Yes	Yes	Yes	Yes
Observations		12,796	6237	4698	1861
R^2		0.813	0.803	0.828	0.831
Panel B: Moderating effect of audit market share					
LNSALARY	±	−0.1008***	−0.0353	−0.1007**	−0.2255***
		(−3.31)	(−0.63)	(−2.56)	(−3.21)
AUDMKTSHR	±	−6.2408***	−4.9796**	−6.2084***	−9.8061***
		(−5.10)	(−2.31)	(−3.42)	(−3.39)
LNSAL*AMKTSHR	+	**0.6051*** **	**0.4903** **	**0.6005*** **	**0.9151*** **
		(5.39)	**(2.46)**	**(3.64)**	**(3.60)**
Rank FE		Yes	N/A	N/A	N/A
Year FE		Yes	Yes	Yes	Yes
Observations		12,796	6237	4698	1861
Adjusted R^2		0.816	0.804	0.830	0.835

*, **, ***: $p < 0.10$, $p < 0.05$, $p < 0.01$, respectively, two-tailed tests. Standard errors are clustered by audit office interacted with year to compute t-statistics. Variable definitions can be found in the appendix Table 10. The sample period includes years 2004 to 2013

subsamples based on rank are noteworthy as well. The coefficient on *LNSALARY* is monotonically declining as the sample changes from associates (coefficient = 0.085) to seniors (coefficient = 0.030) to managers (coefficient = −0.025). These findings suggest that it is potentially more difficult for audit firms to pass the higher cost of senior labor (such as seniors and managers) on to their clients.

We further consider whether audit firms with greater market share have greater ability to pass on their costs to their clients by including an interaction term between audit salary and audit market share. Panel B of Table 9 presents these results. We find that the interaction term is positive and statistically significant in all regression specifications, consistent with market share giving firms greater pricing power. This result suggests audit offices that are not market leaders are constrained on their ability to pass along higher salaries to their clients, which could explain the stagnant salaries over the past decade.

7 Conclusion

This study provides important insights regarding the role of salary in the auditing industry. Specifically, we conduct three types of analyses to explore the factors that relate to variation in audit personnel salaries, whether audit salaries relate to audit quality, and the extent to which audit firms can pass on audit salaries to their clients. We conduct these analyses using data collected from H-1B visa applications to create proxies for salary across associates, seniors, and managers employed by Big 4 audit offices in the United States from 2004 to 2013.

First, we provide descriptive evidence regarding the factors related to audit personnel salary. We show that individuals who work for firms with greater local audit market share receive lower salaries. We also find that salaries tend to be higher for offices with more diverse clients and for offices in locations where the cost of living is higher. Second, we demonstrate that salary is positively related to audit quality. We find that higher levels of salary are associated with reduced restatement frequency, after controlling for factors related to restatements as well as the trade-offs that audit personnel appear to make when accepting a given level of wage. Finally, we show that audit offices do not bear all of the costs of increased costs of labor, as they appear to be able to pass some of the costs to their clients. We document positive and significant associations between salary and office level fees.

These findings offer important insights for academics, regulators and market participants. Archival research has not examined the impact of individual auditor characteristics on audit outcomes, due to the lack of data. We attempt to fill this gap by examining how salary relates to audit quality. Moreover, we address an important regulatory debate regarding the quality of talent in the public accounting industry. Our results suggest that, at least to some extent, higher salaries can help attract higher quality labor and increase the quality of public audits.

While our study is the first to document a relationship between audit personnel salary and audit quality, it is not without its limitations. First, our measurement of audit personnel salary relies on H-1B visa applications. While we attempt to validate the integrity of our data using proprietary school placement data, this data may still contain some noise to the extent that it is unable to pick up on differences within an audit rank (e.g., a first-year audit associate likely earns less than a third-year audit associate). Second, in the absence of an exogenous shock to audit personnel salary, our study cannot cleanly establish a causal relationship between audit personnel salary and audit quality. We attempt to alleviate this concern with the inclusion of control variables that explain a large portion of the variation in audit personal salary and employ various fixed effect specifications including MSA-year fixed effects, along with analyses based on different levels of data aggregation. Finally, we are cautious about making policy recommendations based on our findings, as our study cannot assess all of the costs and benefits associated with offering higher salaries to employees.

Acknowledgements We appreciate helpful comments from Russell Lundholm (editor), an anonymous reviewer, Andrew Acito, Daniel Aobdia, Mary Barth, Scott Bronson, John Donovan, Josh Gunn, Chris Hogan, Patrick Hopkins, Andrew Imdieke, Harold Kazanabon, W. Robert Knechel, Bill Kinney, Mihir Mehta, Miguel Minutti-Meza, Jessie Watkins, and workshop participants at the University of Michigan, Idaho State University, the 2016 Indiana University Accounting Leading Scholars Symposium, the 2016 Illinois Audit Symposium, the 2017 International Symposium on Audit Research (Sydney), the 2017 Midwest Accounting

Research Conference (UW-Madison), the 2018 AAA Audit Midyear Meeting (Portland), and the 2018 AAA FAR Midyear Meeting (Austin). We also express gratitude to the three anonymous Universities that provided us with undergraduate placement and salary data. Finally, we thank Kevin Hoopes for information regarding the H-1B visa data.

Appendix

Table 10 Variable definitions

Independent and dependent measures	
LNSALARY	Natural log of the salary as obtained from the H-1B Visa data. Measure is calculated separately for associated, senior, and manager rank.
LNALTΔ	Natural log of audit personnel salary less the natural log of the average salaries for all Big 4 tax, IT, and consulting professionals in an MSA for a given year.
MISSTATE%	An indicator variable equal to 1 if the current year financial statements are restated in future years and 0 otherwise. Based on restatement data in Audit Analytics. Restatements related to option backdating and leases are classified as nonrestatements for purposes of variable construction. For purposes of aggregation at the MSA audit office level, the variable represents the percentage of clients that have a misstatement in the current year, which is restated during future years.
ADAC_RAVG	The average of the quintile rank of discretionary accruals measured by two-digit SIC code and fiscal year by MSA audit office. Discretionary accruals are calculated consistent with Schroeder and Shepardson (2016), which is the absolute value of the residual obtained from a regression of working capital accruals using a modified Jones model that controls for performance (i.e., return-on-assets), growth (i.e., year over year sales growth), lagged working capital accruals, and nonlinear effects of positive and negative cash flows.
LNFEES	Natural log of total audit fees as obtained from the Audit Analytics database.
MSA salary determinant measures and controls	
JOBCOMPLX	Total number of unique industries (e.g., SIC2) that an audit office covers in their client portfolio in a given year scaled by total clients in the audit office. SIC codes obtained from Compustat.
AUDMKTSHR	The ratio of total MSA audit office fees to total audit fees for a given MSA. Audit fee data obtained from Audit Analytics. MSA classifications consistent with Reichelt and Wang (2010).
LNHOMEP	Natural log of the median home value in a city, based on data obtained from Zillow.
LNPOP	Natural log of the number of residents in a given region.
EDUCATION	Education is a proxy for the level of human capital in a city and is measured as the percentage of the population with graduate degrees.
Controls for the misstatement analyses (not defined above)	
LNASSETS	Natural log of total assets (AT).
MW	An indicator variable equal to 1 if the client discloses a Section 302, 404(a), and/or 404(b) material weakness and 0 otherwise.
LEVERAGE	Total liabilities (LT) divided by total assets (AT).
QRATIO	Current assets (ACT) less inventory (INVT) divided by total current liabilities (LCT).

Table 10 (continued)

ROA	Income before extraordinary items (IB) divided by average total assets (AT) for the fiscal year.
LOSS	An indicator variable equal to 1 if ROA is negative and 0 otherwise.
FNDSRSED	An indicator variable equal to 1 if the sum of new long-term debt (DLTIS) plus new equity (SSTK) exceeds 20% of total assets (AT) and 0 otherwise.
MERGER	An indicator variable equal to 1 if the client discloses merger or acquisition activity and 0 otherwise. Obtained from the Compustat footnote file.
MTB	Market value of equity divided by book value of equity.
IINTCOV	Interest expense (XINT) divided by operating income before depreciation (OIBDP) with the ration capped at a value of 2.0.
Controls for the discretionary accrual analysis (not defined above)	
PPEGROWTH	End-of-year net property, plant, and equipment less beginning-of-year net property, plant, and equipment divided by beginning of year net property, plant, and equipment (ppent).
SGROWTH	End-of-year revenue less beginning-of-year revenue divided by beginning of year revenue (revt).
STD_SALES	Standard deviation of total sales (revt) from the previous 3 years.
STKRET	Buy-and-hold stock return for the firm's fiscal year.
CFO	Operating cash flows for the year (oancf) divided by end-of-year total assets.
STD_CFO	Standard deviation of operating cash flows (oancf) from the previous 3 years.
ZMIJ_SHUM	The Zmijweski measure of financial distress using the coefficients from Shumway (2001).
LNBSEG	Natural log of total business segments as available from the Compustat segment file.
FOREIGN	An indicator variable equal to 1 if the firm discloses foreign sales and 0 otherwise (obtained from the Compustat footnote file).
OPCYCLE	The natural log of the operating cycle, calculated as the sum of 360/cost of goods sold turnover (COGS/INVT average) and 360/sales turnover (REVT/RECT average).
LIT	An indicator variable equal to 1 if the firm is included in a high-risk industry, as defined by Matsumoto (2002), and 0 otherwise. High-risk industries are defined as firms with SIC codes in the following industries: 2833–28,366 (biotechnology), 3570–3577 and 7370–7374 (computers), 3600–3674 (electronics), and 5200–5961 (retailing).
PYTACC	Prior year total accruals. Total accruals calculated as income before extraordinary items (ibc) – operating cash flow (oancf) divided by total assets (at).
Controls for audit fees analyses (not defined above)	
ARINV	Inventory (INVT) plus receivables (RECT) divided by end of year assets (AT).
AGROWTH	End of year assets less beginning of year assets divided by beginning of year assets (AT).
GC	An indicator variable equal to 1 if the audit opinion contains a going concern paragraph and 0 otherwise. Obtained from Audit Analytics Opinion File.
YE	An indicator variable equal to 1 if the client has a calendar year-end and 0 otherwise (FYR).
OP_404b	An indicator variable equal to 1 if the client receives a Section 404(b) internal control audit opinion and 0 otherwise.
ANCRST	An indicator variable equal to 1 if the client announces a restatement during the current year and 0 otherwise.

Table 10 (continued)

MSA Fixed Effects	Indicators for MSA classifications based on Reichelt and Wang (2010).
Year Fixed Effects	Indicators for calendar year.
MSAxYear Fixed Effects	Indicators for MSA x Year classifications.

Variable definitions are for the specific variable. For the salary-aggregation level, all dependent and control variables are aggregated at the MSA audit-office level. For the MSA audit-office aggregation, all variables are aggregated at the audit-office level. For the firm-level analysis, only the LNSALARY variable and MSA-specific variables are aggregated at the MSA audit-office level. Compustat variable names provided in parentheses

References

Akerlof, G. A. (1984). Gift exchange and efficiency-wage theory: four views. *The American Economic Review, 74*(2), 79–83.

Akerlof, G. A., & Yellen, J. L. (1986). *Efficiency wage models of the labor market*. Cambridge: Cambridge University Press.

Akerlof, G. A., & Yellen, J. L. (1990). The fair wage-effort hypothesis and unemployment. *The Quarterly Journal of Economics, 105*(2), 255–283.

Albrecht, W. S., & Sack, R. J. (2000) *Accounting education: Charting the course through a perilous future*. American Accounting Association.

Almer, E. D., Higgs, J. L., & Hooks, K. L. (2005). A theoretical framework of the relationship between public accounting firms and their auditors. *Behavioral Research in Accounting, 17*(1), 1–22.

Aobdia, D. (2016) The validity of publicly available measures of audit quality. Evidence from the PCAOB data. *Working Paper*.

Aobdia, D. (2017). The impact of the PCAOB individual engagement inspection process - Preliminary Evidence. *Forthcoming, The Accounting Review*.

Aobdia, D., Srivastava, A. & Wang, E. (2017). Are immigrants complements or substitutes? Evidence from the Audit Industry. Management Science Forthcoming.

Bamber, L. S., Jiang, J., & Wang, I. Y. (2010). What's my style? The influence of top managers on voluntary corporate financial disclosure. *The Accounting Review, 85*(4), 1131–1162.

Barrios, J. M. (2017) Occupational licensing and accountant quality: Evidence from Linkedin. Working paper.

Beck, M., Francis, J., & Gunn. J. (2017) Public company audits and city-specific labor characteristics. *Contemporary Accounting Research* Forthcoming.

Bertrand, M., & Schoar, A. (2003). Managing with style: the effect of managers on firm policies. *The Quarterly Journal of Economics, 118*(4), 1169–1208.

Bianchi, P. (2018) Auditors' joint engagements and audit quality: Evidence from Italian private companies. Contemporary Accounting Research Forthcoming.

Biddle, G. C., Hilary, G., & Verdi, R. S. (2009). How does financial reporting quality relate to investment efficiency? *Journal of Accounting and Economics, 48*(2–3), 112–131.

Blankley, A. I., Hurtt, D. N., & MacGregor, J. E. (2012). Abnormal audit fees and restatements. *Auditing: A Journal of Practice & Theory, 31*(1), 79–96.

Boland, C. M., Bronson, S. N., & Hogan, C. E. (2015). Accelerated filing deadlines, internal controls, and financial statement quality: the case of originating misstatements. *Accounting Horizons, 29*(3), 551–575.

Bonner, S. E., & Lewis, B. L. (1990). Determinants of auditor expertise. *Journal of Accounting Research, 28*, 1–20.

Bronson, S. N., Hogan, C. E., Johnson, M. F., & Ramesh, K. (2011). The unintended consequences of PCAOB auditing standard nos. 2 and 3 on the reliability of preliminary earnings releases. *Journal of Accounting and Economics, 51*(1), 95–114.

Cappelli, P., & Chauvin, K. (1991). An interplant test of the efficiency wage hypothesis. *The Quarterly Journal of Economics, 106*(3), 769–787.

Carcello, J. V., Hermanson, D. R., & Huss, H. F. (2000). Going concern opinions: the effects of partner compensation plans and client size. *Auditing: A Journal of Practice & Theory, 19*(1), 67–77.

Carey, P., & Simnett, R. (2006). Audit partner tenure and audit quality. *The Accounting Review, 81*(3), 653–676.

Chen, C. X., & Sandino, T. (2012). Can wages buy honesty? The relationship between relative wages and employee theft. *Journal of Accounting Research, 50*(4), 967–1000.

Choi, J.-H., Kim, C., Kim, J.-B., & Zang, Y. (2010). Audit office size, audit quality, and audit pricing. *Auditing: A Journal of Practice & Theory, 29*(1), 73–97.

Choudhary, P., Merkley, K. J. & Schipper, K. (2016) Qualitative characteristics of financial reporting errors deemed immaterial by managers. Working Paper.

Christensen, B. E., Glover, S. M., Omer, T. C., & Shelley, M. K. (2015) Understanding audit quality: insights from audit professionals and investors. Forthcoming, *Contemporary Accounting Research*.

DeAngelo, L. E. (1981). Auditor size and audit quality. *Journal of Accounting and Economics, 3*(3), 183–199.

DeFond, M., & Zhang, J. (2014). A review of archival auditing research. *Journal of Accounting and Economics, 58*(2–3), 275–326.

Dyreng, S. D., Hanlon, M., & Maydew, E. L. (2010). The effects of executives on corporate tax avoidance. *The Accounting Review, 85*(4), 1163–1189.

Ettredge, M. L., Bedard, J. C., & Johnstone, K. M. (2008). Empirical tests of audit budget dynamics. *Behavioral Research in Accounting, 20*(2), 1–18.

Ettredge, M., Heintz, J., Li, C., & Scholz, S. (2011). Auditor realignments accompanying implementation of SOX 404 ICFR reporting requirements. *Accounting Horizons, 25*(1), 17–39.

EY. (2016) EY's Paid Parental Leave Policy in US Increased To 16 Weeks for New Moms and Dads. *PR Newswire*, April 13.

Fehr, E., & Falk, A. (1999). Wage rigidity in a competitive incomplete contract market. *Journal of Political Economy, 107*(1), 106–134.

Fehr, E., & Gächter, S. (2000). Fairness and retaliation: the economics of reciprocity. *The Journal of Economic Perspectives, 14*(3), 159–181.

Fehr, E., Kirchsteiger, G., & Riedl, A. (1993). Does fairness prevent market clearing? An experimental investigation. *The Quarterly Journal of Economics, 108*(2), 437–459.

Ferguson, A., Francis, J. R., & Stokes, D. J. (2003). The effects of firm-wide and office-level industry expertise on audit pricing. *The Accounting Review, 78*(2), 429–448.

Files, R., Sharp, N. Y., & Thompson, A. M. (2013). Empirical evidence on repeat restatements. *Accounting Horizons, 28*(1), 93–123.

France, J. (2015) Office Space: EY's Workplace of the Future plays musical chairs—with more than chairs. *Columbus CEO*, August 17.

Francis, J. R. (2011). A framework for understanding and researching audit quality. *Auditing: A Journal of Practice & Theory, 30*(2), 125–152.

Francis, J. R., & Yu, M. D. (2009). Big 4 office size and audit quality. *The Accounting Review, 84*(5), 1521–1552.

Ghosh, A., & Moon, D. (2005). Auditor tenure and perceptions of audit quality. *The Accounting Review, 80*(2), 585–612.

Hannan, R. L. (2005). The combined effect of wages and firm profit on employee effort. *The Accounting Review, 80*(1), 167–188.

Hannan, R. L., Kagel, J. H., & Moser, D. V. (2002). Partial gift exchange in an experimental labor market: impact of subject population differences, productivity differences, and effort requests on behavior. *Journal of Labor Economics, 20*(4), 923–951.

Hanson, J. D. (2012) Reflections on the State of the Audit Profession presented at the American Accounting Association, Auditing Section, Mid-Year Meeting, January 23, Savannah, GA.

Hanson, J. D. (2013) Keynote Address at Baruch College 12th Annual Financial Reporting Conference May 2.

Hay, D. C., Knechel, W. R., & Wong, N. (2006). Audit fees: a meta-analysis of the effect of supply and demand attributes. *Contemporary Accounting Research, 23*(1), 141–191.

IFIAR (2014) *Current trends in the audit industry.* International Forum of Independent Audit Regulators.

Knechel, W. R., Niemi, L., & Zerni, M. (2013). Empirical evidence on the implicit determinants of compensation in big 4 audit partnerships. *Journal of Accounting Research, 51*(2), 349–387.

Krishnan, J., & Yang, J. S. (2009). Recent trends in audit report and earnings announcement lags. *Accounting Horizons, 23*(3), 265–288.

Laux, C., & Leuz, C. (2009). The crisis of fair-value accounting: making sense of the recent debate. *Accounting, Organizations and Society, 34*(6–7), 826–834.

Levine, D. I. (1993). What do wages buy? *Administrative Science Quarterly, 38*(3), 462–483.

Libby, R., Bloomfield, R., & Nelson, M. W. (2002). Experimental research in financial accounting. *Accounting, Organizations and Society, 27*(8), 775–810.

Malcomson, J. M. (1981). Unemployment and the efficiency wage hypothesis. *The Economic Journal, 91*(364), 848–866.

Marti, C. (1997). Efficiency wages: Combining the shirking and turnover cost models. *Economics Letters, 57*(3), 327–330.

McGinn, D. (2015) This is the perfect hotel for business travelers, but you'll never stay there. *Bloomberg*, March 25.

Messier, W. F., Owhoso, V., & Rakovskit, C. (2008). Can audit partners predict subordinates' ability to detect errors? *Journal of Accounting Research, 46*(5), 1241–1264.

Minnis, M. (2011). The value of financial statement verification in debt financing: evidence from private U.S. firms. *Journal of Accounting Research, 49*(2), 457–506.

Nelson, M., & Tan, H. (2005). Judgment and decision making research in auditing: a task, person, and interpersonal interaction perspective. *Auditing: A Journal of Practice & Theory, 24*(1), 41–71.

Palmrose, Z.-V., Richardson, V. J., & Scholz, S. (2004). Determinants of market reactions to restatement announcements. *Journal of Accounting and Economics, 37*(1), 59–89.

Persellin, J., Schmidt, J. J., & Wilkins, M. S. (2015) Auditor perceptions of audit workloads, audit quality, and the auditing profession. *Working Paper*.

PwC. (2017) *Our focus on audit quality*. 1–29. Available at: https://www.pwc.com/us/en/audit-assurance-services/assets/pwc-our-focus-on-audit-quality-2017.pdf

Reason, T. (2010) Auditing Your Auditor. *CFO* April: 36–42.

Reichelt, K. J., & Wang, D. (2010), National and office-specific measures of auditor industry expertise and effects on audit quality. *Journal of Accounting Research, 48*(3), 647–686.

Reynolds, J. K., & Francis, J. R. (2000). Does size matter? The influence of large clients on office-level auditor reporting decisions. *Journal of Accounting and Economics, 30*(3), 375–400.

Schroeder, J. H., & Shepardson, M. L. (2016). Do SOX 404 control audits and management assessments improve overall internal control system quality? *The Accounting Review, 91*(5), 1513–1541.

Shapiro, C., & Stiglitz, J. E. (1984). Equilibrium unemployment as a worker discipline device. *The American Economic Review, 74*(3), 433–444.

Shumway, T. (2001). Forecasting bankruptcy more accurately: a simple hazard model. *The Journal of Business, 74*(1), 101–124.

Skinner, D. J., & Srinivasan, S. (2012). Audit quality and auditor reputation: evidence from Japan. *The Accounting Review, 87*(5), 1737–1765.

Stevens, D. E., & Thevaranjan, A. (2010). A moral solution to the moral hazard problem. *Accounting, Organizations and Society, 35*(1), 125–139.

Tysiac, K. (2015) More evidence of accelerating growth in accounting and finance salaries. *Journal of Accountancy*, September 9.

Venkataraman, R., Weber, J. P., & Willenborg, M. (2008). Litigation risk, audit quality, and audit fees: evidence from initial public offerings. *The Accounting Review, 83*(5), 1315–1345.

Weintraub, E. R. (2002). *How economics became a mathematical science*. Durham: Duke University Press.

Yellen, J. L. (1984). Efficiency wage models of unemployment. *The American Economic Review, 74*(2), 200–205.

Yellen, J. (1995). Efficiency wage models of unemployment. In S. Estrin & A. Marin (Eds.), *Essential readings in economics* (pp. 280–289). London: Macmillan Education.