Where does the time go? Auditors’ commercial effort, professional effort, and audit quality

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Abstract

Audit theory and regulation assumes that auditors’ commercial motivations conflict with their professional responsibilities and thereby reduce audit quality. While there is no direct evidence to support this widely-held belief, it nonetheless fuels extensive, costly regulatory and standard-setting activities. We propose to examine whether commercial motivations are associated with auditor compensation, audit production, and audit quality. Using data from the internal time reporting systems of two Big Four firms, we proxy commercial motivation as the time that individual audit partners, directors, and senior managers report allocating to commercial activities. Theory and evidence suggest that allocating more time to commercial activities is likely to reflect relatively stronger commercial motivation. We will examine whether an auditor’s commercial effort is related to audit production, proxied by the audit engagement effort in the auditor’s client portfolio, and audit quality as proxied by internal and external quality reviews of engagements in the auditor’s client portfolio. We expect to find that audit firms reward commercial effort and that audit engagement effort decreases in commercial effort. Contrary to critics’ concerns, though, we discuss conditions in which commercial motivations are positively associated with reliance on quality controls which act as safeguards protecting against reductions in audit quality.
1. Introduction

It is an axiom of auditing regulation and theory that auditors’ commercial motivations to maximize wealth conflict with their professional motivations to act in society’s interest by exercising skepticism, independence, and due care (Carey and Doherty 1966; Goldman and Barley 1974; U.S. Supreme Court 1984; Bazerman et al. 1997; Suddaby et al. 2009; AICPA 2021). Commercial motivations are associated with time and effort on activities such as entertaining clients or developing sales proposals. This contrasts with professional motivations associated with performing audit tasks, pursuing continuing education, or mentoring staff. In theory, the conflict arises because there are conditions in which auditors benefit financially by accepting their clients’ opportunistic reporting instead of following professional standards (AICPA 2021; Hoang, Jamal, and Tan 2019). Despite nearly universal agreement that a commercial-professional conflict exists and threatens audit quality, we are aware of no direct evidence testing this conflict.

We will test this taken-for-granted assumption using a private dataset from the internal systems of two Big Four firms in the Netherlands, which captures the time that auditors report allocating to commercial effort and professional effort. We focus on audit partners, directors, and senior managers, as commercial motivations are likely strongest for these auditors. Time allocation is a direct measure of effort in auditing and other professional services, and is closely-monitored by firms (Aobdia 2019; Hoang et al. 2019). Moreover, theory and evidence suggest that, all else equal, allocating more time to commercial activities increases auditors’ beliefs about the importance of those activities and ultimately their motivations to perform those activities well (Coffey 1994; Anderson-Gough et al. 2001; Suddaby et al. 2009; Bergeron et al. 2013).
Further, allocating more time to commercial effort decreases the time available for professional effort (Spence, Zhu, Endo, and Matsubara 2017). This implies that greater commercial effort will be associated with lower audit engagement effort and lower audit quality. Our study will test this by examining the relation between auditor commercial effort and audit(or): (i) compensation, (ii) production, and (iii) quality.

We expect a positive association between an individual auditor’s commercial effort and compensation, because audit firms’ compensation systems tend to reward individuals who manage more or larger clients, suggesting commercial effort increases compensation (Knechel et al. 2013; Dekeyser et al. 2021; Vandenhaute et al. 2020). Further, we expect that an auditor’s commercial effort is negatively associated with the effort exerted on audit engagements within that auditor’s client portfolio, consistent with the large literature that discusses the tension between commercialism and professionalism (Gendron 2002; Guo 2016; Malsch and Gendron 2013; Suddaby and Greenwood 2005). We offer competing predictions for audit quality, reasoning that a negative association is consistent with conventional wisdom. However, a positive association between commercial effort and audit quality is plausible when one considers the culture and structure of contemporary audit firms. Firms have developed cultures that allow commercial and professional motivations to coexist (Gendron and Spira 2010). Moreover, we provide theory to argue that stronger commercial motivations likely lead an auditor to rely more on two key quality controls: increased willingness to consult experts and increased assignment of knowledgeable personnel on the auditor’s engagements. If either of these condition holds, then there is likely to be a positive association between commercial motivations and audit quality.

We will test our hypotheses using archival data obtained from the internal finance, human resources, and engagement management systems of two large public accounting firms in the
Netherlands. These firms have agreed to provide us with our requested data in coordination with the Foundation for Auditing Research in the Netherlands. We will specify a series of generalized equations modeling our dependent variables as a function of our independent variable(s) of interest and appropriate controls consistent with prior literature (Bell et al. 2015; Bell et al. 2008; Dekeyser et al. 2021; Knechel et al. 2013). We provide details about the data and proposed analyses in Sections 3 and 4.

Our study will make several contributions. First, our novel data allows us to provide direct evidence on a taken-for-granted assumption that dominates audit theory and regulation: the notion that commercial motivation threatens audit quality. Much of the literature on this topic is qualitative or theoretical (see, for example, Gendron 2002). A few studies have used survey techniques to measure the relative strength of commercial and professional motivation (Bamber and Iyer 2002; Lord and DeZoort 2001; Suddaby et al. 2009) and recent research examines auditors’ economic incentives and audit quality (Dekeyser et al. 2021; Vandenhaute et al. 2020). However, there is no empirical evidence that addresses (1) whether or not firms actually reward investments of time (i.e. auditor effort) in commercial activities and (2) whether or not commercial effort is associated with audit engagement effort or quality.

This will contribute both to auditing and to the broader literature on the professions. Regulators across the globe express ongoing concern about commercial motivations decreasing audit quality (e.g., AFM 2018; Brown 2021). For instance, the European Commission notes that multiple stakeholders have asked audit firms and regulators to establish clearer incentives for individual auditors to provide high-quality auditing and to enhance mechanisms to instill professional motivation in auditors (European Commission 2011). The PCAOB and the Dutch Authority for the Financial Markets (AFM) have expressed similar concerns.
Second, our research will contribute to the emerging literature examining audit firm quality control (Lennox et al. 2020; Nagy 2014) by testing the relation between key quality controls such as consultation systems and personnel assignment and the delivery of high quality audits. Our findings will be relevant to regulators who are currently considering revisions to quality control standards (PCAOB 2019), as we will provide evidence on the utilization of these controls and the association between these controls and audit quality.

2. Theory and Hypotheses

Commercial Motivations in Auditing

Auditors serve society by providing assurance that their clients’ financial reports are fairly stated, with the responsibility to maintain due care, independence, and professional skepticism (AICPA AU Section 220; AICPA AU Section 230; U.S. Supreme Court 1984; Harris 2017). However, auditors work in for-profit firms and are financially dependent on the clients who hire them, pay their fees, and fire them (Hanlon 1996; Suddaby et al. 2007). This creates a potential conflict between auditors’ commercial motivations and the quality of their professional judgment, as auditors must maintain objectivity towards the clients they are attempting to attract, satisfy, and retain (Bazerman et al. 1997; Moore et al. 2006; Nelson 2006; Zeff 2003a; 2003b; Wyatt 2004; Guo 2016).

In response, laws, professional standards, and audit firm policies have long recognized and sought to mitigate this conflict by prohibiting certain commercial activities and financial ties to clients (AICPA 2021; PCAOB AS 1005). For example, in the early 20th century, the American Institute of Accountants (1917) Rules of Professional Conduct proposed eight rules, three of
which prohibit commercial activities.\textsuperscript{1} Similarly, \textit{Ethical Standards of the Accounting Profession} bluntly argues that “[t]he professional attitude requires renunciation of the promotional methods of the commercial world” (Carey and Doherty 1966, p. 148). These concerns persisted as professional standards relaxed to allow audit firms to market their services and expand their offerings of non-audit services, e.g., prompting four former SEC Chairmen to argue for “preserving the all-important principle of auditor independence from commercial client relationships” (Breeden et al. 2000). Soon thereafter, the Sarbanes-Oxley Act banned additional commercial activities, specifically, selling certain non-audit services to audit clients (U.S. Congress 2002). Regulators have imposed similar restrictions in the E.U., U.K., Japan, and elsewhere. In spite of this, audit firms continue to engage in commercial activities, prompting ongoing claims that commercial motivations in auditing threaten audit quality (Bazerman and Moore 2011; European Commission 2011; Harris 2017; Brown 2021).

Despite the persistent notion that commercial motivations impair professional judgment and thereby audit quality, we are aware of little, if any, direct evidence supporting this axiom. For example, archival studies examine the association between audit quality and providing non-audit services—a rough proxy for the presence of cross-selling opportunities that could strengthen commercial motivations—but do not find a reliable association (Ashbaugh-Scaife et al. 2003; Lim and Tan 2008; Bell et al. 2015). Other studies, mostly survey and qualitative, have examined how auditors’ commercial motivations strengthen in response to the expansion of non-audit services, increasingly close relationships with clients, audit firm evaluation and monitoring controls, and political activities and public relations by professional bodies (e.g., Covaleski et al.

\textsuperscript{1} These rules banned advertising, being paid commissions, and soliciting other accountants’ clients. The AICPA relaxed the ban on advertising in 1977 after the U.S. Supreme Court ruled that a similar ban in the legal profession was unconstitutional (Heischmidt and Elfrink 1991), and removed the ban entirely in 1990 in an agreement with the Federal Trade Commission (Boze and Law 2003).
1997; Greenwood and Suddaby 2006; Suddaby et al. 2009; Guo 2016).\(^2\) In brief, this research stream finds that auditor attitudes and values are more consistent with commercial ideals than, for example, investor protection. The ideal “auditing professional” must espouse many commercial values (Suddaby et al. 2009).

**Hypothesis Development**

A central issue in this ongoing debate is how auditors allocate their time and effort. Wyatt (2004) and Zeff (2003a; 2003b) argue that focusing time and effort on non-accounting and non-auditing tasks strengthens commercial motivation and erodes professional motivation. The opportunity and pressure to engage such tasks, like marketing and selling services, is quite strong given that audit firms function as multidisciplinary professional service firms (Bazerman et al. 1997; Zeff 2003a; 2003b; Wyatt 2004). Suddaby et al. (2009) provide empirical evidence supporting these ideas by surveying 1,300 Canadian public accountants on their commitment to professionalism (i.e., to the profession, to the concept of independence) and to commercial values (i.e., to clients, to their employing organization, to the commercial value of an accountant certification). They find that allocating more than half of one’s time outside accounting and auditing tasks—a proxy for work with “more commercial content”—is associated with stronger commitment to clients and the organization. Expanding this, Bergeron et al. (2013) argue that time is best viewed as a resource in professional services settings—the input that is most directly measurable and most controllable by professionals. They find that individuals and the broader

\(^2\) Many of these studies focus on how institutional pressures like expanding non-audit service lines shape commercial and professional motivations over time, and thus assume professional and commercial motivations are continuously shifting with institutional pressures. Suddaby et al. (2009) note that many conclusions from this research would not change if one assumed motivations were a stable construct. In our sample period, no major institutional shifts occur and thus we make no assumptions about the stability of commercial motivations over time.
firm view the time allocated to a task as a reflection of the importance of that task, all else equal.\(^3\)

This reinforces prior findings on the importance of time in auditing and other professional services: firms earn revenue by selling professionals’ time, professionals frame their contributions in terms of time allocations, and firms closely monitor billable hours and realization rates (Coffey 1994; Anderson-Gough et al. 2001). For instance, in a qualitative study of entry-level U.K. auditors, Coffey (1994) finds that both the auditors and their firm view the time allocated to an activity as a reflection of auditors’ commitment to that activity. Extending this idea, Anderson-Gough et al. (2001) interview 154 entry-level auditors at multiple points in time, and find that time management is one of the first “skills” taught to auditors. Kornberger et al. (2011) find that firms train audit managers and assess readiness for partnership in part by increasing the complexity of their time management duties. These findings are consistent with a stream of studies suggesting that time allocation drives audit partners’ attitudes and values. For example, in Covaleski et al. (1998), audit partners report that firms’ controls recast one’s identity in terms of billable time (“I have become identifiable as a revenue stream” p. 293).

There is substantial evidence that professional services firms apply pressure on auditors to devote more time and effort to commercial activities (Sherer 1995; Gilson and Mnookin 1989). Despite such pressure, auditors enjoy significant autonomy over how they allocate time and effort (von Nordenflycht 2010). As owners, partners maximize firm profit and thereby their own compensation by attracting clients and deploying as many junior staff as possible into billable roles (Sherer 1995). To encourage this, firms implement controls to strengthen newly-

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\(^3\) This is broadly consistent with traditional psychology theories of motivation, which propose that a person’s motivation is a function of 1) the link between their effort and an outcome, and 2) the attractiveness of that outcome (e.g., Vroom 1964). That is, auditors’ commercial motivations are a function of how much they desire commercial success and the degree to which they expect that devoting time to commercial activities will deliver this success.
promoted partners’ commitment to client service and increase their effort devoted to selling the firm’s services. Systems of promotion and compensation tend to reward investments in these commercial activities by partners, directors, and senior managers (Gilson and Mnookin 1989).

As a result, commercial effort is likely to be positively associated with auditor compensation. In choosing a compensation system, audit firms generally base some of auditors’ compensation on performance, which provides returns on auditors’ individual effort and likely rewards commercial effort (Knechel et al. 2013; Vandenhauwe et al. 2020). Consistent with this, prior studies suggest that audit firm compensation systems reward auditors for managing client portfolios with higher numbers of clients and higher fee revenue (Dekeyser et al. 2021; Vandenhauwe et al. 2020). This leads to our first hypothesis:

\[ H1: \quad \text{An audit auditor’s commercial effort is positively associated with the auditor’s compensation.} \]

Turning to audit production, theory suggests that information asymmetry between the auditor and the auditee makes it difficult for the auditee to assess how much audit effort is necessary to achieve reasonable assurance (Causholli and Knechel 2012; Aobdia, Siddiqui, and Vinelli 2021). Causholli and Knechel (2012) suggest that these *credence attributes* allow the auditor to under- or over-audit across their client portfolio without being detected by clients. If an auditor engages in under-auditing (over-auditing) audit effort will be less (more) than would be required to obtain the appropriate level of assurance for their audit clients. It is possible that competition over audit fees would constrain over-auditing, thus we focus on under-auditing.

To the extent that the audit partner is more commercially motivated and thus exerts more commercial effort, the auditor is likely to seek to increase the profitability of their engagements (Gendron 2002). Firms evaluate partners on their ability to deliver reasonable assurance while using the minimum amount of resources, especially by emphasizing time budgets and applying
time pressure to constrain the consumption of audit staff time (McDaniel 1990). When faced with a greater emphasis on time budgets, auditors are less likely to perform additional testing (Bauer, Estep, and Malsch 2019), more likely to rely upon internal auditing (Gramling 1999), and more likely to sign-off on audit procedures without sufficient review (Knechel et al. 2013). This would suggest that as commercial effort increases, auditors will have lower audit effort on their engagements. Given theory and prior empirical evidence, we predict that:

\[ H2: \text{An individual auditor’s commercial effort is negatively associated with audit effort in the auditor’s client portfolio.} \]

For audit quality, theory and evidence suggests competing hypotheses. If an auditor’s commercial motivation is associated with minimizing audit engagement effort, then it is intuitive that the individual’s audit quality would likely decrease, all else equal. However, a negative association between commercial motivation and audit quality is possible even without assuming reduced effort. Theory strongly suggests that auditors who invest in commercial effort because they more commercially motivated also place higher value on commercial effort (Coffey 1994; Covaleski et al. 1997). In turn, these partners, directors, and senior managers may set a “tone at the top” of the audit team that places primary emphasis on commercial values, and there is substantial evidence that tone at the top helps shape the judgments of audit team members (e.g., Peecher 1996; Aobdia 2019). Fiolleau et al. (2013) examine a large public company’s auditor appointment process—a setting in which auditors’ commercial motivations are likely strong. They find that auditors focus on learning management’s needs, as opposed to assessing risk, and emphasize their commitment to meeting these needs. Further, Hoang et al. (2019) examine an audit firm’s national office data and find that client service delivery is a primary determinant of engagement profitability. A small stream of experimental papers suggests this is likely to worsen auditor judgment, finding that auditors are less willing to detect or challenge client opportunism.
when they have greater affinity for their clients (Koch and Salterio 2017), perform well on client service (Ricci 2021), or work for a firm that actively monitors client satisfaction (Aghazadeh and Hoang 2020). These arguments suggest a negative association between commercial effort and audit quality:

H3a: An individual auditor’s commercial effort is associated with lower audit quality in the auditor’s client portfolio.

Even so, it is not a foregone conclusion that commercial motivation would negatively impact audit quality. At a minimum, auditors are motivated to maintain a reasonable level of quality in order to preserve favorable institutional arrangements, such as government-protected monopolies on financial statement certification, which would not be feasible if quality were consistently poor. To achieve this, firms can develop cultures and internal processes that support the co-existence of commercial motivation and professional motivation, including investments in training and technical guidance to assist audit teams with complex matters (Malsch and Gendron 2013; Guo 2016). As a result, decision-making in audit firms remains heavily influenced by professional motivations despite increased commercial pressures (Aranya et al. 1981; Aranya and Ferris 1984; Gendron 2001, Gendron 2002; Gendron and Spira 2009; 2010). Further, firms invest in quality controls to detect and correct poor audit engagement performance.

Building on this point, we argue that there are compelling reasons to expect a positive relation between an individual auditor’s commercial motivations and audit quality. Our argument centers on two important quality control processes in audit firms: consultation and personnel assignment. These processes are the primary channels to supplement an auditor’s expertise with additional, qualified people, reflecting the reality that auditors who invest heavily in commercial effort can still leverage the knowledge, skills, and effort of others (Greenwood and Empson 2003). Consultation refers to an auditor receiving input from another person in the firm who is
not part of the engagement team, often but not always involving the firm’s national office or technical consulting unit (e.g., Knechel and Leiby 2016; Dodgson et al. 2020). Personnel assignment refers to the process of staffing engagements with professionals who, as a team, have adequate training and proficiency (PCAOB 2002).

We argue that these quality controls allow a commercially motivated auditor who exerts more commercial effort to nonetheless have the most professionally capable team. Based on prior research, devoting more time to commercial activity leads auditors to value commercial norms and to view commercial attributes as central to their reputation within the firm (Coffey 1994). That is, an auditor who excels at sales is likely to have a reputation that includes being a good salesperson. There is evidence that a positive reputation increases an auditor’s compensation and power within the firm (Greenwood and Empson 2003; Knechel et al. 2013). As a result, an auditor benefits from actions that preserve and enhance their reputation. Theory suggests that, all else equal, these reputation concerns motivate professionals to signal key attributes that differentiate them from peers (Zwiebel 1995). An important way to do so is signaling confidence in these skills, performing tasks that require these skills independently, and avoiding help (Lee 1997; Levy 2004; Chen and Ishida 2015; Bol and Leiby 2018).

Thus, an auditor whose reputation depends on technical accounting or auditing knowledge would likely be resistant to engaging in frequent consultation or staffing their engagements with top technical talent. By contrast, an auditor whose reputation depends more on commercial skills would be less resistant to consultation or assigning top technical talent to their teams. Even if firm management interpreted this as a signal that the auditor lacks some technical skills, the auditor with a reputation for commercial skill has little to lose by sending this signal. As a result, auditors who exert more commercial effort may be more likely to rely on
consultations and the assignment of highly-skilled personnel on their engagements. All else equal, this suggests commercial effort would likely be positively related to audit quality:\(^4\)

\(H3b:\) An individual auditor’s commercial effort is associated with higher audit quality in their client portfolio.

3. Data

We will obtain the data with the assistance of the Foundation for Auditing Research (FAR) based in the Netherlands. The FAR is a nonprofit organization funded by the nine largest audit firms in the Netherlands in response to a Dutch government directive to improve audit practice and audit quality. One of FAR’s core activities is promoting collaboration between audit researchers and practitioners by sponsoring research projects selected by its independent academic board and providing these projects with access to proprietary data. After the FAR selected our project for support, two audit firms contractually agreed to deliver the data necessary to execute this project. At present, the first sponsoring firm has supplied a portion of the data for 149 audit individuals for a panel of 596 auditor-years spanning the period from 2016 to 2019. This firm has agreed to deliver all the measures we propose to use in this registered report. We are in ongoing discussions to obtain additional control variables and outcome/audit quality measures. The second firm has delivered pilot data but has not yet completed a full panel. We anticipate both firms will complete data collection by Fall 2021.

We have collaborated closely with the firms to identify measures to test our research questions. We have had several meetings with each firm to discuss data that is available versus unavailable, with unavailability determined either by the data not existing or the data being unfeasible to collect. The datasets will include:

\(^4\) In this vein, auditors with strong commercial motivation have higher work satisfaction (Herrbach and Kosmala 2006) which could lead to higher quality output.
Audit Partners/Directors’ Recorded Time – audit partner/director/senior manager hours on commercial activities, hours billable to audit engagements, internal projects, and professional development.

Non-Partners/Directors’ Recorded Time – hours recorded by audit staff, seniors, and managers for each engagement managed by each partner/director/senior manager.

Compensation and Profitability – audit partner/director/senior manager salaries and bonuses, audit partner equity distributions; audit fees for each engagement, internal overhead rates by rank.

Audit Quality Measures and Quality Controls - aggregate average ratings of audit engagements managed by the auditor from internal reviews, external peer reviews, and regulatory reviews, number of consultations, and audit engagement leverage.

All data analysis must occur within a research environment hosted by a third party data manager, which we access via VPN and remote login. Firms upload raw data directly to this environment, and the data manager ensures the data cannot be linked to firms or individual auditors. This helps ensure the transparency and integrity of the research process. We have signed non-disclosure agreements with the FAR, and the FAR fully supports our registered report proposal.

To examine our questions, data will be organized by individual auditor with a unique anonymous identifier for the auditor (e.g., employee ID multiplied by a common factor). We will use this identifier to merge the audit personnel data with audit office and audit firm data. We expect to receive data for approximately 250 unique auditors that are active senior manager, directors or partners in the audit practice. In total we expect to obtain 1,000 auditor-year observations equally split between the two firms. See Appendix 1 for variable definitions.
4. Planned Analysis and Research Design

To test our first hypothesis that auditor remuneration is positively related to commercial effort, we will use a mixed model that utilizes the restricted maximum likelihood principle consistent with Knechel, Niemi, and Zerni (2013):

\[
\ln_{\text{COMP}}_{ijt} = \alpha_0 + u_{ijt} + \beta_1 \text{COMM}_{ijt} + \beta_2 \ln_{\text{L&E}}_{ijt} + \beta_3 \ln_{\text{MENTOR}}_{ijt} + \\
\beta_4 \ln_{\text{QC}}_{ijt} + \beta_5 \ln_{\text{NAH}}_{ijt} + \beta_6 \ln_{\text{RECRUIT}}_{ijt} + \\
\beta_7 \ln_{\text{CONSULT}}_{ijt} + \beta_8 \ln_{\text{AF}}_{ijt} + \beta_9 \ln_{\text{L&E}}_{ijt} + \beta_{10} \text{EVAL}_{ijt} + \\
\beta_{11} \text{EQ}_{ijt} + \beta_{12} \text{NONCOMP}_{ijt} + \beta_{13} \ln_{\text{PUBLIC}}_{ijt} + \beta_{14} \text{RISK}_{ijt} + \\
\beta_{15} \ln_{\text{AGE}}_{ijt} + \beta_{16} \text{RANK}_{ijt} + \beta_{17} \ln_{\text{NRTENURE}}_{ijt} + \beta_{18} \text{IND}_{ijt} + \\
\beta_{19} \ln_{\text{BIG_MKT}}_{ijt} + \beta_{20} \ln_{\text{FIRMPFT}}_{jt} + \beta_{21} \ln_{\text{FIRMAF}}_{jt} + \\
\beta_{22} \ln_{\text{FIRMNAF}}_{jt} + \beta_{23} \ln_{\text{FIRMPUBLIC}}_{jt} + \text{Year fixed effects} + \varepsilon \quad (1)
\]

Our dependent variable is the natural log of one plus total compensation for auditor i in year t (\(\ln_{\text{COMP}}_{ijt}\)). Total compensation is the sum of an auditor’s salary, bonus, and equity distributions. \(\text{COMM}\) is our independent variable of interest. We utilize two measures of commercial effort: \(\ln_{\text{P&D}}_{ijt}\) and \(\ln_{\text{CE}}_{ijt}\). \(\ln_{\text{P&D}}\) is measured as the natural log of one plus total practice and development time of auditor i of firm j in year t. \(\ln_{\text{CE}}\) is the natural log of one plus the total client entertainment expense incurred by auditor i of firm j in year t. We include several controls for auditor and audit firm characteristics that are expected to impact auditor remuneration. Specifically, we include measures of professional effort (\(\ln_{\text{L&E}}, \ln_{\text{MENTOR}}, \ln_{\text{QC}}, \ln_{\text{NAH}}\)), quality control (\(\ln_{\text{CONSULT}}\)), the auditor’s book of business (\(\ln_{\text{AF}}\) and \(\ln_{\text{LNAF}}\)), auditor quality (\(\text{EVAL}\) and \(\text{NONCOMP}\)), audit team quality (\(\text{EQ}\)), client complexity (\(\ln_{\text{PUBLIC}}\)), client risk (\(\text{RISK}\)), auditor experience (\(\ln_{\text{AGE}}, \ln_{\text{RANK}}, \ln_{\text{NRTENURE}}\)), auditor specialization (\(\text{IND}\)), audit market size (\(\ln_{\text{BIG_MKT}}\)), audit firm financial health (\(\ln_{\text{FIRMPFT}}, \ln_{\text{FIRMAF}}, \) and \(\ln_{\text{FIRMNAF}}\)) and audit firm client complexity (\(\ln_{\text{FIRMPUBLIC}}\)). We include random auditor-specific intercepts and cluster robust standard errors by auditor. All variables are defined in Section 7.
To test our second hypothesis we will estimate the following ordinary least squares regression:

\[ \text{EFF}_{ijt} = \alpha_0 + \beta_1 \text{COMM}_{ijt} + \beta_2 \text{LN}&\text{L&E}_{ijt} + \beta_3 \text{MENTOR}_{ijt} + \beta_4 \text{LNQC}_{ijt} + \]
\[ B_5 \text{LNAH}_{ijt} + \beta_6 \text{LNRECRUIT}_{ijt} + \beta_7 \text{LCONSULT}_{ijt} + \]
\[ B_8 \text{LNAF}_{ijt} + \beta_9 \text{LNNAF}_{ijt} + \beta_{10} \text{NONCOMP}_{ijt} + \beta_{11} \text{EVAL}_{ijt} + \]
\[ \beta_{12} \text{LNPUBLIC}_{ijt} + \beta_{13} \text{RISK}_{ijt} + \beta_{14} \text{LNAGE}_{ijt} + \beta_{15} \text{RANK}_{ijt} + \]
\[ \beta_{16} \text{LNR_TIME}_{ijt} + \beta_{17} \text{IND}_{ijt} + \beta_{18} \text{BIG_MKT}_{ijt} + \]
\[ \text{Year fixed effects} + \epsilon \]  \hspace{1cm} (2)

Our dependent variable \( \text{EFF} \) is measured as \( \text{LNTOTAL_HOURS} \) which is the natural log of one plus total hours charged to all audit engagements of auditor \( i \) of firm \( j \) in year \( t \) for all staff levels. Our variable of interest is as defined previously. We include controls for client portfolio size (\( \text{LNAF} \)), knowledge-spillovers (\( \text{LNNAF} \)), auditor experience (\( \text{LNAGE}, \text{RANK} \), and \( \text{LNR_TIME} \)), auditor quality (\( \text{EVAL}, \text{NONCOMP} \), and \( \text{IND} \)), client riskiness (\( \text{RISK} \)), and client complexity (\( \text{LNPUBLIC} \)) consistent with prior literature (Duh et al. 2020; Knechel and Sharma 2012). We include year fixed effects and estimate robust standard errors clustered by auditor.

To test our third hypothesis we will specify a Poisson regression following Bell et al. (2015):

\[ \text{EQ}_{ijt} = \alpha_0 + \beta_1 \text{LNP&D}_{ijt} + \beta_2 \text{LN}&\text{L&E}_{ijt} + \beta_3 \text{MENTOR}_{ijt} + \beta_4 \text{LNQC}_{ijt} + \]
\[ B_5 \text{LNAH}_{ijt} + \beta_6 \text{LNRECRUIT}_{ijt} + \beta_7 \text{LCONSULT}_{ijt} + \]
\[ B_8 \text{LNAF}_{ijt} + \beta_9 \text{LNNAF}_{ijt} + \beta_{10} \text{NONCOMP}_{ijt} + \beta_{11} \text{EVAL}_{ijt} + \]
\[ \beta_{12} \text{LNPUBLIC}_{ijt} + \beta_{13} \text{RISK}_{ijt} + \beta_{14} \text{LNAGE}_{ijt} + \beta_{15} \text{RANK}_{ijt} + \]
\[ \beta_{16} \text{LNR_TIME}_{ijt} + \beta_{17} \text{IND}_{ijt} + \beta_{18} \text{BIG_MKT}_{ijt} + \]
\[ \beta_{19} \text{ENGLEV}_{ijt} + \text{Year fixed effects} + \epsilon \]  \hspace{1cm} (3)

Our dependent variable is \( \text{EQ} \) which is defined as the average audit engagement quality of auditor \( i \) of firm \( j \) in year \( t \). Our variable of interest is as defined previously. We include controls for client portfolio size (\( \text{LNAF} \)), knowledge-spillovers (\( \text{LNNAF} \)), client complexity (\( \text{LNPUBLIC} \)), client riskiness (\( \text{RISK} \)), auditor experience (\( \text{LNAGE}, \text{RANK} \), and \( \text{LNR_TIME} \)), and other audit quality measures. We include year fixed effects and estimate robust standard errors clustered by auditor.
and auditor expertise (IND). We will cluster robust standard errors by auditor and include year fixed effects.

We conduct a power analysis to verify that our proposed empirical tests will correctly reject the null when the null is false. We utilize the following formula from Cohen (1988, p.414) to estimate the power of our tests:

\[ \lambda = f^2 \times (\mu + v + 1) \]

where

\[ f^2 = R^2 / (1 - R^2) \]

and

\[ v = (n - \mu - 1) \]

For our auditor remuneration tests, \( \mu \) is the sum of all independent variables plus random intercepts for each auditor plus year fixed effects plus the constant (i.e. \( \mu = 24 + 249 + 3 + 1 = 277 \)). We solve for \( v = (1000 - 277 - 1) = 722 \). Next, we set \( R^2 = 0.89 \) consistent with the highest \( R^2 \) reported in Dekeyser et al. (2021) Table 3 Panel D.\(^5\) We compute \( f^2 = 0.10 \) and solve for \( \lambda = 0.10 \times (277 + 722 + 1) = 100 \). Assuming \( \alpha = 0.01 \), we refer to Table 9.4.1 of Cohen (1988) and find the power of our test exceeds 0.90 which is greater the conventional threshold of 0.80 (Borkowski et al. 2001).

Turning to our audit effort and quality tests, \( \mu \) is the sum of all independent variables plus year fixed effects plus the constant (i.e. \( \mu = 20 + 3 + 1 = 24 \)) for both sets of analysis. We solve for \( v = (1000 - 24 - 1) = 975 \). Next, we set \( R^2 = 0.16 \) consistent with the highest \( R^2 \) reported in Bell et al. (2015) Table 4 Panel A. We compute \( f^2 = 0.13 \) and solve for \( \lambda = 0.13 \times (24 + 975 + 1) \)

\(^5\) We set the \( R^2 \) at the highest reported level to be conservative. Smaller \( R^2 \) would yield larger \( \lambda \) increasing the expected power of our tests.
= 130. Assuming $\alpha = 0.01$, we refer to Table 9.4.1 of Cohen (1988) and find the power of our test exceeds 0.99 which is greater the conventional threshold of 0.80 (Borkowski et al. 2001).

5. Additional Analysis

In addition to our main analysis, we will conduct a series of additional analyses for robustness. Our primary analysis of H2 using Equation (2) focuses on the amount of effort that is used for a given auditor’s client portfolio. An auditor’s commercial effort is not only likely to be related to the total amount of effort expended on their audit engagements but also the type of effort used and the speed with which those engagements will be completed. Therefore we will modify Equation (2) utilizing two alternative dependent measures to reflect the type of effort used ($ENGLEV$) and the speed with which the audit engagement is completed ($AUDLAG$).

$ENGLEV$ is the ratio of the aggregate number of partner/director/senior manager hours on all audit engagements for auditor i of audit firm j divided by the aggregate number of hours by all other personnel working on audit engagements for auditor i of audit firm j in year t. This measure will provide additional evidence about the amount of effort exerted on the auditor’s audit engagements. It will also provide some evidence about quality control for the auditor’s audit engagements as higher ratios would suggest more skilled and experienced labor which we expect will result in higher audit quality. $AUDLAG$ is the average number of days between the year-end date and the date fieldwork is completed for audit clients of auditor i of audit firm j in year t. This measure will provide additional evidence about the efficiency of the audit engagement where efficiency is defined as the speed at which the engagement is completed rather than minimizing the amount of audit team effort to complete the engagements. The participating audit firms have committed to providing these measures.
We will also employ four additional dependent measures for our estimation of Equation (3). Three of these measures will provide evidence about the use of quality controls within the audit process (i.e. inputs to enhance audit quality). The first, $\text{LNCONSULT}$, is the natural log of the total number of hours incurred by technical consultants for clients of auditor i of audit firm j in year t. The second, $\text{LNMCON}$, is the natural log of one plus the total number of mandatory consultations initiated by auditor i of audit firm j for the auditor’s audit engagements in year t. This measure will provide evidence about the extent of quality control usage driven by the audit firm. The third measure, $\text{LNVCON}$, is the natural log of one plus the total number of voluntary consultations initiated by auditor i of audit firm j for the auditor’s audit engagements in year t. This measure is a more direct assessment of the extent to which a given auditor chooses to utilize quality controls absent a requirement from firm policy. Our last measure of quality will be $\text{EVAL}$ which is the annual performance rating of auditor i of firm j in year t. The scale is converted such that a one is the lowest possible score and a five in the highest. This measure will reflect the audit firm’s assessment of the quality of a given auditor. It will be a function of the individual’s performance with respect to both their commercial and professional obligations. The participating audit firms have committed to providing these measures.

We are also working with the Foundation for Auditing Research to collect additional data from publicly available sources. Such an effort would allow us to incorporate additional measures of dependent and independent variables. With respect to dependent variables, we plan to identify incidences of modified opinions, going-concern opinions, and financial statement restatements as well as estimate discretionary accruals measures to supplement our other audit quality measures. We will also attempt to obtain data to construct additional control variables,
such as number of business segments, to provide additional comfort about the robustness of our results. We believe that we will be able to obtain most of the measures we are requesting.

We will also conduct cross-sectional analysis to examine whether an auditor’s role within the firm influences the relation between commercial effort and audit engagement effort or quality for a given auditor’s client portfolio. It is likely that more experienced auditors will have relatively stronger economic self-interest to pursue commercial success thus they will have the strongest commercial motivation leading to greater investments in commercial activities. We will use two measures of auditor experience, $FIRM\text{TENURE}$ and $RANK\text{TENURE}$. $FIRM\text{TENURE}$ is defined as the natural log of one plus the number of years auditor $i$ has worked for firm $j$ as of year $t$. $RANK\text{TENURE}$ is defined as the natural log of one plus the number of years auditor $i$ has served in the auditor’s current rank as of year $t$. We will split our sample at the median between individuals with relatively high versus low $FIRM\text{TENURE}$ or $RANK\text{TENURE}$, respectively, run our analysis on the separate subsamples. We will then compare the coefficients across the two subsamples to test for significant differences consistent with Chow (1960).

Finally, recall that our logic for H2 and H3 suggests that auditors’ commercial effort may influence audit engagement effort and quality by (1) affecting the labor mix on engagements, as partners who exert more commercial effort may have more clout and be able to secure better resources on their engagements, or (2) affecting the willingness to use consultation channels. This implies an indirect effect in which commercial effort influences consultation and/or labor mix, and consequently influences audit quality. We will test this indirect effect by testing for statistical mediation using the Hayes (2018) bootstrapping methodology.

6. Pilot Study

Not applicable.
7. Appendix 1

**Dependent Variables**

*LN_COMP*<sub>it</sub>  
The natural log of one plus total compensation for auditor i of firm j in year t. Compensation is measured as the sum of *SALARY* plus *BONUS* plus *EQUITY*.

*SALARY*  
Total annual salary for auditor i of firm j in year t.

*BONUS*  
Total annual bonus compensation awarded to auditor i of firm j in year t.

*EQUITY*  
Total share of equity for auditor i of firm j in year t.

*LNTOTAL_HOURS*  
The natural log of one plus total hours charged to all audit engagements of auditor i of firm j in year t for all staff levels.

*EQ*<sub>ijt</sub>  
Measure of average audit engagement quality of auditor i of firm j in year t. This measure is computed as the number of engagements that received a satisfactory rating divided by the number of engagements that were subject to a review. Engagement reviews include internal reviews, external peer reviews, and regulatory reviews.

*ENGLLEV*<sub>ijt</sub>  
The ratio of the aggregate number of partner/director hours on all audit engagements for auditor i of firm j divided by the aggregate number of hours by all other personnel working on audit engagements for auditor i of firm j in year t.

*AUDLAG*<sub>ijt</sub>  
The average number of days between the year-end date and the date fieldwork is completed for audit clients of auditor i of firm j in year t.

*LNCOMMENT*<sub>ijt</sub>  
The natural log of the total number of hours incurred by technical consultants for clients of auditor i of firm j in year t.

*LNMCON*<sub>ijt</sub>  
The natural log of one plus the total number of mandatory consultations initiated by auditor i of firm j for the auditor’s audit engagements in year t.

*LNVCON*<sub>ijt</sub>  
The natural log of one plus the total number of voluntary consultations initiated by auditor i of firm j for the auditor’s audit engagements in year t.

*EVAL*<sub>ijt</sub>  
The annual performance rating of auditor i of firm j in year t. The scale is converted such that a one is the lowest possible score and a five in the highest.

**Independent Variables**

*LN_P&D*<sub>ijt</sub>  
The natural log of one plus the total number of hours auditor i of firm j incurred preparing proposals to attract new business from either existing or new clients in year t.

*LNCE*<sub>ijt</sub>  
The natural log of one plus the total amount of expenses incurred by auditor i of firm j in year t entertaining existing or new clients.

*LNL&E*<sub>ijt</sub>  
The natural log of one plus the total number of hours auditor i of firm j incurred when completing continuing education and training in year t.

*LNMENTOR*<sub>ijt</sub>  
The natural log of one plus the total number of hours auditor i of firm j incurred mentoring junior staff in year t.
$\text{LNQC}_{ijt}$ The natural log of one plus the total number of hours auditor $i$ of firm $j$ incurred conducting engagement quality reviews of other auditors in year $t$.

$\text{LNAH}_{ijt}$ The natural log of one plus the total number of hours auditor $i$ of firm $j$ incurred when working on audit engagements in year $t$.

$\text{LNRECRUIT}_{ijt}$ The natural log of one plus the total number of hours auditor $i$ of firm $j$ incurred when recruiting new staff for the firm in year $t$.

$\text{LNAF}_{ijt}$ The natural log of one plus total audit fees generated by auditor $i$ of audit firm $j$ in year $t$.

$\text{LNNAF}_{ijt}$ The natural log of one plus total audit fees generated by auditor $i$ of audit firm $j$ in year $t$.

$\text{NONCOMP}_{ijt}$ Indicator variable taking a value of one if auditor $i$ of audit firm $j$ is subject to a non-compliance assessment in year $t$; 0 otherwise. An individual will be deemed non-compliant for violations of policy such as an independence violation or non-compliance with internal procedures.

$\text{LNPUBLIC}_{ijt}$ The natural log of one plus the total number of audit clients of auditor $i$ of audit firm $j$ that are publicly listed in year $t$.

$\text{RISK}_{ijt}$ Average aggregate risk of the client portfolio of auditor $i$ of firm $j$ in year $t$.

$\text{LNAGE}_{ijt}$ The natural log of one plus the age of auditor $i$ of audit firm $j$ in year $t$.

$\text{RANK}_{ijt}$ An ordered variable taking a value of one if the auditor is a manager, two if the auditor is a director, and three if the auditor is a partner.

$\text{LNRTENURE}_{ijt}$ The natural log of one plus the length of time in years that auditor $i$ of audit firm $j$ has held their current rank.

$\text{IND}_{ijt}$ An indicator variable taking a value of one if auditor $i$ of audit firm $j$ is an industry specialist for year $t$; 0 otherwise. An auditor is deemed to be a specialist if the individual spends more than 50% of their time serving audit clients of one industry.

$\text{BIG_MKT}_{ijt}$ An indicator variable taking a value of one if auditor $i$ works in an audit office in the Randstad in year $t$; 0 otherwise. The Randstad includes Rotterdam, Hague, and Amsterdam.

$\text{LNFIRMPFT}_{jt}$ The natural log of one plus total profit generated from all audit clients of audit firm $j$ in year $t$.

$\text{LNFIRMAF}_{jt}$ The natural log of one plus total audit fees generated by audit firm $j$ in year $t$.

$\text{LNFIRMNNAF}_{jt}$ The natural log of one plus total non-audit fees generated for all clients of audit firm $j$ in year $t$.

$\text{LNFIRMPUBLIC}_{jt}$ The natural log of one plus the total number of publicly listed clients of audit firm $j$ in year $t$.

**Cross-sectional Variables**

$\text{FIRMTENURE}_{ijt}$ The natural log of one plus the number of years auditor $i$ has worked for firm $j$ as of year $t$.

$\text{RANKTENURE}_{ijt}$ The natural log of one plus the number of years auditor $i$ has served in the auditor’s current rank as of year $t$. 


