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Internal Control Deficiencies and Audit Staffing

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Abstract: We analyze how engagement lead partners staff audits with types of internal control deficiencies (ICD). Previous literature suggests that audit teams react to the discovery of ICDs by increasing effort in order to keep audit quality constant. However, audit effort is a multifaceted construct due to the heterogeneity of auditor characteristics within an audit team. We argue that the hours worked by expert personnel, such as high-ranking auditors and specialists, represent a scarce resource for the audit firm. In the internal control setting, engagement lead partners are likely to use this resource when audit teams encounter wide-scope ICDs, such as entity wide and IT-related ICDs. Using proprietary data on the audit processes of Big 4 audit firms in the Netherlands, we find evidence in line with this argument. When wide-scope ICDs are encountered during the audit, more audit hours are worked by expert auditors. In contrast, only non-expert auditors work more audit hours in engagements with narrow-scope ICDs, such as account level ICDs. In additional analyses, we find that the combination of expert audit effort and ICD scope is associated with audit outcomes and audit quality. Overall, we provide novel evidence on audit staffing in the presence of internal control deficiencies.

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1. Introduction

We analyze the variation in auditor's reactions to different types of internal control deficiencies (ICD). The audit of internal controls is one of the most important parts of an auditor's responsibilities during the annual audit. Effective internal controls ensure that financial misstatements are either detected and corrected by management or do not occur in the first place. If internal control are deficient, the firm's auditor is expected to increase audit effort in accordance to audit standards such as the PCAOB's AS1101. Accordingly, the auditor should be able to keep audit quality constant by reacting to the discovery of an internal control deficiency. Previous literature in the field has found that audit fees are higher in such cases (Hogan and Wilkins 2008, Raghunandan and Rama 2006) and that this increase is at least partially caused by an increase in auditor effort (Bae et al. 2021).

However, it remains unclear how audit effort is provided during the engagement. Studies such as Bae et al. (2021), Niemi (2002) and Che et al. (2018) use audit hours to measure audit effort. However, there is likely considerable heterogeneity in the marginal productivity of audit hours since auditors differ in rank, experience, and education. For example, prior literature documents the relevance of specialized auditors with audit task specific knowledge (e.g., Mascarenhas et al. 2010). In addition, the assignment of high-ranking and experienced audit personnel is positively related to audit quality (Suzuki and Takada 2023).

In this paper, we analyze how engagement lead partners staff audit personnel to audit engagements conditional on the type of detected ICDs. The type of ICD is informative to capital markets (Hammersley et al. 2008), and different ICD types require different resources within the firm for remediation (Johnstone et al. 2011). For example, entity level ICDs are more strongly associated with fraud (Donelson et al. 2017) and more difficult to remediate (Hammersley et al

2012). Similarly, deficiencies in internal controls that are related to IT affect management's ability to process information and to operate the firm efficiently (Kuhn et al. 2013, Li et al. 2012).

The combination of ICD type and audit effort type is relevant because auditors likely differ in their ability to deal with ICDs. For example, Haislip et al. (2016) and Brazel and Agoglia (2007) find that auditors' IT expertise impacts their ability to detect and remediate IT deficiencies in internal controls. In line with these findings, we argue that auditors are more likely to assign expert personnel to audit engagements with wide-scope ICDs (i.e., entity level or IT deficiencies) as compared to audit engagements with narrow-scope ICDs (e.g., account level or accounting ICDs). We measure the expert status of audit personnel through auditors' certification, rank, salary, and their role as a specialist within the firm.

Results for our main analysis are in line with expectations. We find that the discovery of wide-scope ICDs is significantly associated with the number of audit hours worked by expert personnel. In contrast, this number is not significantly associated with the number of narrow-scope ICDs. These findings suggest that engagement lead partners assign audit personnel in a way that matches the scope of the detected ICDs.

Next, we examine the use of non-expert personnel in audit firms. We argue that audit firms may use such personnel in audits with narrow-scope ICDs that do not require expert personnel, or as a substitute for expert personnel when not enough such personnel is available. Results are in line with our expectations. We find that hours worked by low-salary personnel are significantly higher for audits with narrow-scope ICDs. This finding is in line with our argument that, in the presence of such ICDs, engagement lead partners are able to keep audit quality constant by staffing engagements with non-expert personnel. Moreover, we find that the hours worked by low-rank and low-salary personnel are significantly higher for audits with wide-scope ICDs. This finding suggests that these ICDs either require additional effort beyond that worked by expert personnel,

or that engagement lead partners substitute expert personnel with non-experts due to capacity constraints.

For robustness, we then analyze an additional dimension of audit effort. Instead of adding additional personnel to the engagement team, audit teams may also increase audit effort by increasing the hours worked by the current audit team members. For example, an audit team may encounter ICDs that increase the need for substantive testing above the budgeted amount, but that do not require the addition of specialized expert personnel. We find that both the amount of narrow-scope and the amount of wide-scope ICDs are positively related to the number of hours worked above budget by each auditor in the team, and that the estimated coefficient is higher for wide-scope ICDs. In combination with the result of our main analysis, this suggests that wide-scope ICDs require both the use of expert personnel and an increased workload of the existing audit team. In contrast,the results suggest that narrow-scope ICDs require a lower increase in the workload of the existing team and no addition of expert personnel.

Next, we analyze the impact of auditor tenure in a mechanism analysis. Literature suggests that auditor efficiency during the engagement increases with tenure as the auditor becomes familiar with the client firm (Lee et al. 2009). Consequently, we expect that audit firms use more expert personnel when wide-scope ICDs are present in first-time audits, as the audit firm lacks familiarity with the client firm's structure and processes. We find that, on average, expert personnel provides fewer audit hours during first-time audits. However, when wide-scope ICDs are discovered during first-time audits, the number of audit hours worked by expert personnel is significantly higher than it is for later audits.

In our final analyses, we examine how variation in audit staffing in the presence of ICDs impacts audit outcomes. Although engagement lead partners arguably need to assign expert personnel to an engagement in the presence of wide-scope ICDs, due to capacity constraints, the

amount of expert personnel within an audit firm is likely limited. Consequently, engagement lead partners may not always be able to assign the optimal personnel to engagements with wide-scope ICDs. In the following, we examine how this trade-off translates into audit quality.

In our first outcome analysis, we examine how the combination of ICD scope and audit effort type is related to the audit adjustment rate. When auditors find misstatements during the audit process, they discuss these misstatements with management. Optimally, this leads to an adjustment of the misstatement. However, not all misstatements found during the audit are adjusted (e.g., Libby and Kinney 2000). We find that the ratio of adjusted misstatements to identified misstatements is positively associated with the audit hours provided by expert personnel in the presence of wide-scope ICDs. This result suggests that input-based audit quality increases when the engagement lead partner assigns expert personnel to an engagement in the presence of wide-scope ICDs.

Second, we explore how the combination of ICD scope and audit effort type is related to outcome-based audit quality. In line with prior literature (Carey and Simnett 2006), we use abnormal working capital accruals (AWCA) as an inverse measure of audit quality. Our results show that audit hours provided by expert personnel are associated with lower AWCA in the presence of wide-scope ICDs. This finding suggests that expert personnel is able to keep audit quality constant when wide-scope ICDs are present. In contrast, we find that an increase in the workload of the existing audit team in the presence of wide-scope ICDs is associated with an increase in AWCAs. This suggests that wide-scope ICDs translate into lower audit quality in the absence of expert personnel.

We contribute to the audit literature in two ways. First, we provide evidence how engagement lead partners staff engagements in order to increase audit effort as a reaction to the discovery of internal control deficiencies. Previous literature views audit effort as a single construct

and treats audit hours as homogeneous. This is a simplification, as the effects of audit hours on audit outcomes likely vary depending on who provides these hours (e.g., Christensen et al. 2021, Suzuki and Takada 2023). To the best of our knowledge, we are the first to analyze different types of audit effort by distinguishing between hours worked by expert and non-expert audit personnel.

Second, we provide evidence that different types of ICDs are associated with different reactions in engagement staffing and audit effort. Previous literature often measures internal control quality through a binary variable that captures the existence of one or more internal control deficiencies. This implies that different ICDs have a comparable effect on audit effort. However, it is likely that variation in the nature and severity of ICD leads to a variation in audit effort reactions. To the best of our knowledge, we are the first to show that engagement lead partners staff engagements dependent on the detected type of ICD.

The remainder of this paper is structured as follows. Section 2 reviews the relevant literature and derives our hypothesis. Section 3 gives an overview over the sample and regression models. Section 4 presents the results of those models. Section 5 concludes.

2. Literature Review

The Audit of Internal Controls

The relevance of the audit of internal control quality within the audit process is well documented (e.g. DeFond and Zhang 2014, Chalmers et al. 2019). Internal control over financial reporting is intended to ensure that the firm's financial statements are free of material misstatements. Consequently, the firm's auditor may rely on the results of a client's internal controls if those controls are of high quality. Conversely, if the client's internal controls are weak, the auditor is required to do more testing of the firm's financial statements, as low quality internal controls generally decrease the reliability of financial records (Ashbaugh-Skaife et al. 2008). The auditor

thus tests the quality of a client's internal controls early in the audit process to determine whether extra effort will be needed due to internal control deficiencies. Any deficiencies the auditor finds are communicated to management and noted in the engagement files. Literature documents that auditors find a significant number of deficiencies in internal controls that the client firm did not find. For instance, Bedard and Graham (2011) find that auditors identify deficiencies before they result in misstatements of financial statement.

The idea that auditors increase audit effort as a reaction to the presence of internal control weaknesses is codified in the Audit Risk Model (ARM, PCAOB 2004). According to the ARM, overall audit risk is determined by the product of inherent risk, control risk, and detection risk. The higher the control risk, the lower the detection risk needs to be in order to keep audit risk constant. As auditors can decrease detection risk by increasing audit effort, the ARM implies that auditors need to increase audit effort in order to keep audit quality constant in the presence of internal control weaknesses.

Literature provides some evidence that the ARM functions as intended. For example, studies that use audit fees as a proxy for audit effort find a significant and positive association between internal control deficiencies and audit fees (e.g. Hogan and Wilkins 2008, Hoag and Hollingsworth 2011, Blankley et al. 2012). Bae et al. (2021) use audit hours in the South Korean audit setting and similarly provide evidence that audit effort is higher in audits where ICDs are present. Ruhnke and Schmidt (2014) also find evidence that this increased effort is linked to systematic adjustments in auditors' processes.

However, it is unclear which auditors provide audit effort during the engagement. Audit effort is a multidimensional construct, as it can be increased by increasing the current audit team's workload or by assigning new auditors to the audit. In addition, expert auditors may be able to increase audit qualities in complex situations where non-expert personnel would be unable to do

so. Measuring audit effort through audit fees or audit hours disregards this heterogeneity of audit input. Consistent with these arguments, Cameran et al. (2018) document that audit team composition is relevant for both audit processes and audit outcomes. Similarly, Hackenbrack and Knechel (1997) suggest that audit firms use personnel with different qualities strategically dependent on client characteristics. In addition, Christensen et al. (2021) find that increasing audit effort by increasing an audit team's workload is likely to decrease audit quality when this workload becomes too heavy. This suggests that team size and auditor workload do not act as perfect substitutes in increasing audit effort.

However, auditors likely face capacity constraints, as a limited amount of personnel is available, especially in terms of expert personnel such as audit specialists. Engagement lead partners consequently need to decide to which audit engagements they assign expert personnel.[1] During the audit of internal controls, we argue that this decision is a function of the scope of the ICDs detected during the audit.

ICD Scope

Internal control deficiencies vary significantly in scope. For example, accounting related or account level ICDs are generally viewed as having a narrower scope (e.g. Doyle et al. 2007). Examples for such ICDs in our sample include a lack of physical counts of inventory, lack of controls over journal entries, or lack of documentation in financial statements. While such ICDs increase the likelihood of a misstatement in financial statements, they affect a limited amount of areas within the firm and

[1] In general, previous literature argues that audit firms staff audits such that the cost of audit inputs is minimized, under the constraint that audit quality does not decrease below a certain threshold (O'Keefe et al. 1994). However, O'Keefe et al. (1994) hold the quality of the client's internal control systems constant. We are interested in the audit firm's audit production strategy when the audit reveals variance in clients' internal control quality.

accounts in the firm's financial statements. Consequently, they pose a specific and contained threat to audit quality (in line with Donelson et al. 2017).

In contrast, entity wide ICDs can systematically threaten audit quality throughout the entire organization. An example of an entity level ICD could be the management's ability to override account-level internal controls and conduct earnings management (Morris 2011). In line with this argument, Donelson et al. (2017) find that entity wide ICDs alone drive the positive association between ICD disclosure and management fraud. Hammersley et al. (2012) find that such ICDs are more difficult to remediate, which is in line with the idea that they affect several elements in the firm.

Similarly, IT-related internal control deficiencies have a wider scope and may pose a critical threat to audit quality, as the flow of information, decision making systems, and financial reporting systems in the firm are all dependent on functioning IT controls (Kuhn et al. 2013). Consequently, firms with IT-related deficiencies in internal controls have a lower ability to forecast earnings (Li et al. 2012), weaker financial performance (Kuhn et al. 2013), lower investment efficiency (Choi et al. 2021) and lower accrual quality (Heninger et al. 2018). As the IT systems of large firms can be highly complex, IT-related deficiencies also take significantly longer to remediate (Canada et al. 2009).

In line with this, we argue that IT-related internal control deficiencies represent a larger challenge for the firm's auditors. First, IT-related ICDs have a significant impact on the firm's operational and financial performance as well as its accounting system (e.g. Heninger et al. 2018, Stoel and Muhanna 2011), which suggests that the likelihood of a material misstatement is higher if such a deficiency is present. Second, the IT systems of modern firms are often complex and difficult to understand for personnel with no IT background (e.g. Curtis et al. 2009). As a result,

large audit firms commonly use IT specialists in order to assist the audit team with IT-related parts of the audit (Bauer et al. 2019).

Consequently, we predict that non-expert auditors may be unable to handle the complexity of wide-scope ICDs, and may consequently be unable to keep the audit assurance level sufficiently high in such cases. Instead, the engagement lead partner may assign expert personnel who are more suited to the task to such engagements. In contrast, we do not expect the engagement lead partner to assign audit experts to engagements with narrow-scope ICDs such as account-related or accounting ICDs, as non-expert auditors should be able to handle such issues by increasing the amount of substantive testing. In line with this argumentation, we formulate the following hypothesis:

H1: Audit engagement partners assign more expert personnel to engagements with wide-scope ICDs.

3. Sample and Methodology

Sample

We make use of a proprietary data set of 430 audit engagements from two out of four Big 4 audit firms in the Netherlands[2]. During the data collection process, we first identified all Dutch firms with at least $5 million in total assets. This results in 990 unique firms, for which we request audit engagement data for the financial years 2017, 2018, and 2019. This initial data request was then handed over to the *Foundation for Auditing Research (FAR)* and the responsible liaisons at the Big 4 audit firms. We then received anonymized engagement data for a subsample of the initial firms.

[2] Interviews with members of these audit firms indicate that general reliance on internal controls in the Netherlands is low compared to other European countries, which makes the Netherlands an interesting setting for the analysis of audit effort reactions to internal control deficiencies.

Our sample includes both public and nonpublic firms and comprises most of the audit firms' largest clients by revenue and total assets.

For each client firm-year observation, we have access to detailed data regarding the audit process and outcomes. These data are hand collected from the respective audit engagement files by members of each audit firm. General engagement data include planned and actual audit hours, budgeted and actual audit fee, materiality, and ex-ante engagement risk assessment. The audit team data include characteristics such as age, tenure, certification, number of engagements, salary, as well as the number of hours spent on an engagement by each auditor. This data structure allows us to track team size and team composition over the duration of the audit. Data on internal controls is available on the ICD level and includes a description of the ICD itself, a description of how it was detected, the financial statement lines that are affected, and an assessment of the severity of the ICD. Similarly, data on identified misstatements includes the reason and amount of the misstatement as well as the financial statement lines affected. Finally, the FAR team collected auditee financials. All variables are winsorized at the 1% and 99% levels.

The great detail level of our proprietary data allows us to conduct analyses on the audit of internal controls and audit effort production beyond those of previous literature. In particular, many studies of the ARM use audit fees as a proxy for audit effort (e.g., Hogan and Wilkins 2008, Blankley et al. 2012, Lobo and Zhao 2013) which may capture both audit hours but also a risk premium (Bae et al. 2021). Given the greater level of detail of our data, we do not only have a precise measure of the actual adjustment of audit hours during the audit process (e.g., number of hours worked above budget in an engagement) but also have information on audit hours by rank, tenure, and salary, which allows us to differentiate between hours worked by expert and non-expert personnel.

Methodology

To test hypothesis H1, we examine the relation between the number of wide-scope ICDs detected during the audit and the assignment of expert personnel to the engagement. We argue that wide-scope ICDs require audit effort provided by audit experts in order to ensure that audit quality is at a sufficient level. As the availability of such personnel to audit firms is limited, we expect that audits with narrow-scope ICDs will not be staffed with such auditors. This represents an efficient use of a scarce resource for the audit firm (see O'Keefe et al. 1994). Specifically, we run regression models (1) and (2):

$$HrsExperts_{i,t} = \beta_0 + \beta_1 \#WideScopeICD + \sum_j \beta_{j+1} Control_j + \mu + \eta + \varepsilon_{i,t}, \quad (1)$$

$$HrsExperts_{i,t} = \beta_0 + \beta_1 \#NarrowScopeICD + \sum_j \beta_{j+1} Control_j + \mu + \eta + \varepsilon_{i,t}, \quad (2)$$

where *i* indicates the client firm, *t* the year, μ year fixed effects, and η industry fixed effects.

HrsExperts is measured as the natural logarithm of the number of audit hours worked by expert personnel. The latter is defined as (1) auditors with the rank of director or partner (*HighRankHrs*), (2) auditors who are in the top 20% of the sample in terms of yearly salary (*HighSalaryHrs*), (3) auditors who have the certification of RA (*RAHrs*), and (4) auditors who are in the top 20% of the sample regarding the number of yearly engagements and in the bottom 20% regarding the hours worked per engagement (*SpecialistHrs*)[3].

We proxy for the expert status of audit personnel in several ways in order to increase robustness. First, high-ranking auditors are more likely to be experts. In line with this idea, Contessotto et al. (2021) find that audit teams with higher ranking members require less effort for similar audit output, leading to cost savings for the firm. Second, we make use of data on the

[3] Interviews with audit firm personnel indicate that auditors who a) work on a large number of engagements and b) work comparatively few hours on most of these engagements are likely to be specialists. Such auditors work exclusively on one part of the audit and do so for several engagements per year.

professional certification of auditors that are available in our dataset. In the Dutch educational system, the *registeraccountant* (RA) is the equivalent to a CPA or chartered accountant. The title of RA can only be achieved by graduating with a Master of Science, completing a centralized post-master accountancy program, and completing a three-year traineeship in accountancy, which authorizes the RA to issue audit reports. As a consequence, we expect that RAs are expert personnel and constitute a scarce resource to the auditor. This is reflected by the fact that 17.8% of all auditors in our sample are RAs. Third, literature provides evidence that audit specialists are added to audit teams to help with highly complex problems. For example, audit teams may require the assistance of IT specialists in order to deal with complicated IT-related issues (Estep 2019, Hirsch 2020), or make use of valuation specialists to corroborate management estimates (Griffith et al. 2015). Audit specialists are generally viewed as a complementary resource to the core audit engagement team (e.g., Hux 2017). Finally, we use auditors' salary as a measure of their expert status as auditor salary is linked to more effective audit work (Hoopes et al. 2018).

#WideScopeICD is defined as the total number of IT-related and entity level ICDs encountered in the firm year. Conversely, *#NarrowScopeICD* as the total number of accounting-related or account level ICDs encountered in the firm year. Our data set records the amount of accounts affected by each ICD, which allows us to identify entity level and account level ICDs. We then identify IT-related and accounting-related ICDs by analyzing the description of the ICD that the auditor files during the engagement. We argue that entity level and IT-related ICDs have a larger scope and pose a larger threat to audit quality than accounting-related and account level ICDs.[4]

[4] Our results are qualitatively and quantitatively similar when we analyze IT-related, entity wide, account level, and accounting-related ICDs separately rather than categorizing them.

Control is a vector of the control variables *TotalAssets*, *ROA*, *CurrentRatio*, *Leverage*, and *EngagementRisk*. *TotalAssets* is the natural logarithm of the client firm's total assets and reflects the fact that larger firms require more audit effort in order to complete the audit. *ROA* is the client firm's return on assets and reflects the fact that less profitable firms require more audit effort, for example because they lack the funds necessary to invest in accounting systems and internal controls over financial reporting (Doyle et al. 2007). In order to further capture firm specific risk factors, we use *CurrentRatio* defined as the client firm's current assets divided by its current liabilities and *Leverage* defined as the client firm's total liabilities divided by total assets. Finally, *EngagementRisk* is the auditor's assessment of the overall engagement risk, noted before the beginning of the audit process. This variable is taken from our proprietary data set and captures the effects of firm specific risks already known to the auditor before the engagement.[5] We include year (μ) and Fama-French 48 classification industry (η) fixed effects. We estimate both regression models with OLS and cluster standard errors on the client firm level. We expect β_1 to be positive in regression model 1, suggesting that engagement partners assign more expert personnel to engagements with more wide-scope ICDs. We expect no such association for regression model 2.

4. Results

4.1 Descriptive Statistics

Table 1 displays descriptive statistics. As FAR provides data that are transformed through multiplication with an unknown factor[6], we provide the natural logarithm of total assets.

[Insert Table 1 here]

[5] This is important as controlling for the auditor's ex-ante assessment of risk allows us to interpret our regression estimates as reactions to ICD discovery.

[6] This leaves statistical inference through regression models untouched and allows the construction of ratio variables that are meaningful.

Fewer than 50% of all observations have a wide-scope ICDs. However, the distribution is skewed to the right, with a maximum of 11 wide-scope ICDs in one firm year. From the variables that capture hours of expert personnel *RAHrs* has the highest mean while *SpecialistHrs* has the lowest mean. The average firm in our sample is profitable with an ROA of 3%.

Table 2 displays the Pearson correlation coefficients among our main variables. All four measures of expert audit hours are significantly associated with the discovery of wide-scope ICDs ($p < 0.01$). This is preliminary evidence that engagement partners assign expert personnel to audit engagements where such ICDs are present. In addition, our measures for expert audit hours are positively associated with firm size (*TotalAssets*, $p < 0.01$) and ex-ante engagement risk (*EngagementRisk*, $p < 0.01$). None of the audit effort measures are significantly correlated with profitability.

[Insert Table 2 here]

The hours provided by high ranking audit personnel are positively and significantly correlated with the hours provided by high-salary personnel (0.60), the hours provided by RAs (0.73), and the hours provided by specialists (0.35, all $p-values < 0.01$). The correlations suggest that these measures capture hours worked by similar, but not identical audit personnel.

4.2 Main Results

Table 3 displays the results of estimating the four different versions of regression model 1.

[Insert Table 3 here]

We find a positive and significant association between the number of significant wide-scope ICDs detected during the audit and the hours worked by expert audit personnel. In particular, wide-scope ICDs *(#WideScopeICD*) are associated with more hours worked by high-ranked personnel

(*HighRankHrs*, $p < 0.01$), more hours worked by high-salary personnel (*HighSalaryHrs*, $p < 0.05$), more hours worked by certified accountants (*RAHrs*, $p < 0.10$), and more hours worked by specialists (*SpecialistHrs*, $p < 0.01$). In addition, firm size (*TotalAssets*) is significantly associated with all four measures ($p < 0.01$). These results support hypothesis H1, i.e., that engagement lead partners staff expert personnel to engagements with more wide-scope ICDs.

Table 4 displays the results of estimating regression model 2.

[Insert Table 4 here]

Results are in line with expectations. We find no significant association between the presence of narrow-scope ICDs *(#NarrowScopeICD*) and audit hours worked by high-rank (*HighRankHrs*), high-salary (*HighSalaryHrs*), or certified auditors (*RAHrs*). These findings suggest that engagement lead partners do not assign expert auditors to engagements with narrow-scope ICDs. The audit hours provided by audit specialists (*SpecialistHrs*) is significantly associated with the number of narrow-scope ICDs *(#NarrowScopeICD*, $p < 0.05$). The latter finding suggests that specialist work may be needed to keep audit quality constant in the presence of narrow-scope ICDs as well as in the presence of wide-scope ICDs.

In conclusion, the results of regression models 1 and 2 provide novel evidence that engagement lead partners staff engagements with different personnel depending on the scope of ICDs encountered during the audit. Particularly, the findings suggest that audit firms view expert audit personnel as a scarce resource and use this resource for audit engagements where audit quality is threatened by wide-scope ICDs. In contrast, this resource is not used in audits with low-scope ICDs.

4.3 Additional analyses

Use of Non-Expert Auditors

The results of regression models 1 and 2 suggest that engagement lead partners react to the discovery of wide-scope ICDs by staffing expert audit personnel to the engagement. The effort provided by these experts subsequently keeps audit quality constant. Alternatively, engagement lead partners may deal with ICDs by increasing the number of non-expert audit personnel for two reasons. First, engagement lead partners may not deem it necessary for expert personnel to work on an engagement with narrow-scope ICDs, as those ICDs arguably do not require effort by expert personnel, but may rather require an increase in the amount of substantive testing. Similarly, to keep audit quality constant in the presence wide-scope ICDs, some level of substantive testing may also be necessary. Second, audit firms often face capacity constraints as the number of expert auditors is limited. As a result, engagement lead partners sometimes may have to address wide-scope ICDs by assigning non-expert personnel to the engagement.

In our first additional analysis, we analyze this idea by examining how ICD scope relates to the audit effort provided by non-expert personnel. We test these ideas by replacing *HighRankHrs* and *HighSalaryHrs* by *LowRankHrs* and *LowSalaryHrs*, where the latter two variables are calculated as total team hours minus the former two variables, respectively. Table 5 displays the results.

[Insert Table 5 here]

We find that wide-scope ICDs are associated with more audit hours worked by low-rank auditors (*LowRankHrs*, $p < 0.01$) and by low-salary auditors (*LowSalaryHrs*, $p < 0.05$). Combined with the results of our main analysis, these findings suggest that wide-scope ICDs require additional effort from both expert and non-expert personnel. Narrow-scope ICDs are associated with more audit hours worked by low-salary (*LowSalaryHrs*, $p < 0.05$), but not audit hours worked by low-rank auditors (*LowRankHrs*, $p > 0.10$). This finding is in line with our expectation that such ICDs require substantive testing in order to keep audit quality constant. They also suggest that

wide-scope ICDs require more work done by non-expert personnel, either to substitute expert personnel or because wide-scope ICDs increase the amount of substantive testing that is required.

The Role of Workload per Auditor

Next, we analyze the association between ICD scope and the workload per auditor. So far, we have analyzed the amount of hours worked by expert and non-expert status. However, audit teams can arguably increase this amount in different ways. Engagement lead partners may assign additional personnel to audit teams in order to increase the hours worked by this team. Alternatively, an audit team can increase audit hours when the existing personnel increases its workload beyond the amount that was initially budgeted. This distinction is relevant as an increase in the workload of a single auditor can impair audit quality (Christensen et al. 2021).

In order to distinguish between an increase in team size and an increase in the workload of the existing team, we create the variable *OvertimePerAuditor*, which is calculated as the audit team's actual minus budgeted hours, divided by team size. This variable is consequently higher if audit effort is increased by an increase in workload per auditor, and lower if audit effort is increased by increasing team size. The use of the difference between actual and planned hours allows us to identify an increase of audit effort during the audit, in line with the ARM. We then regress this variable on the number of wide-scope and narrow-scope ICDs detected during the audit. Table 6 displays the results.

[Insert Table 6 here]

We find that both narrow-scope (*#NarrowScopeICD*) and wide-scope (*#WideScopeICD*) ICDs are associated with an increase in the workload per auditor (*OvertimePerAuditor*, $p < 0.01$). On average, audit team members increase their workload by 3.3 hours per narrow-scope ICD and by 6 hours per wide-scope ICD. In line with prior results, this finding suggests that the audit effort

increase required by wide-scope ICDs is significantly larger than that required by narrow-scope ICDs. In combination with our earlier results, this result also suggests that audit teams increase effort in the presence of narrow-scope ICDs by increasing the workload of the existing team rather than adding expert personnel. In contrast, audit teams react to wide-scope ICDs by both increasing the audit team's workload and adding expert personnel.

The Role of First-Time Audits

Next, we analyze the moderating role of first-time audits. We argue that the audit effort that is necessary to keep audit quality constant in the presence of wide-scope ICDs is lower when the auditor has audited the client before and can build on this experience (in line with Bedard and Johnstone 2010). In contrast, when the auditor audits the client for the first time, the team is less familiar with the client's operations and its accounting system, suggesting that more audit effort is required to keep audit quality at an acceptable level in the presence of wide-scope ICDs.

To test this prediction, we analyze the moderating effect of new audit clients on the staffing reactions to different types of ICD. We define *NewAudit* as 1 if the audit firm audits the client for the first time, and 0 otherwise. We then add *NewAudit* and an interaction effect between *NewAudit* and *#WideScopeICDs* to regression model (1). We interpret the estimated coefficient of this interaction effect as the moderating effect of a first-time audit on audit staffing as a reaction to the presence of wide-scope ICDs. Table 7 presents the results.

[Insert Table 7 here]

Results are in line with our argumentation. We find that the association between the number of wide-scope ICDs and audit hours worked by expert personnel is significantly stronger when the audit firm audits a client firm for the first time ($p < 0.01$). This suggests that auditors gain experience and familiarity with client firms' internal controls after the first audit of a client,

allowing them to hold audit quality constant in the presence of wide-scope ICDs while providing less expert effort.

ICD Scope, Audit Effort Type, and Audit Outcomes

Finally, we examine how the combination of ICD scope and audit staffing is related to audit outcomes. Specifically, we investigate to what extent increasing expert personnel's audit effort in the presence of wide-scope ICDs is associated with an improvement in audit outcomes.

We first analyze how the combination of ICD scope and audit effort by expert personnel is related to the audit adjustment rate. When auditors identify accounting errors, they report those errors to the client firm which corrects them. However, client firms have some leeway regarding the correction of small accounting errors. This may lead to reduced audit quality, for example when the manager of a client firm uses uncorrected accounting errors in order to manage earnings (Libby and Kinney 2000). Consistent with this idea, we are interested in how the combination of ICD scope and experts' audit effort is associated with the rate of audit adjustment correction.

We define the variable *AuditAdjustmentRate* as the total amount of adjusted audit misstatements divided by the total amount of identified audit misstatements. We then regress this variable on *#WideScopeICD*, our measures of audit effort provided by expert auditors, and their respective interaction terms. We expect the audit adjustment rate to be higher when expert auditors provide audit effort in the presence of wide-scope ICDs. Table 8 displays the results.

[Insert Table 8 here]

Results suggest that ICD scope and audit staffing jointly influence audit adjustment rate. Specifically, auditor rank (*HighRankHrs*, $p < 0.05$), salary (*HighSalaryHrs,* one-tailed $p < 0.10$), and certification (*RAHrs*, $p < 0.05$) significantly moderate the relation between the number of wide-scope ICDs (*#WideScopeICD*) and audit adjustment rates (*AuditAdjustmentRate*). We find no

moderating relation for specialist auditors (*SpecialistHrs*, $p > 0.10$). Taken together, we view these results as evidence that the audit adjustment rate is higher when engagement lead partners assign expert audit personnel to engagements with wide-scope ICDs.

Second, we analyze how the combination of audit effort type and ICD scope is associated with audit quality. We use abnormal working capital accruals (*AWCA*) as an inverse measure of audit quality in line with Carey and Simnett (2006). *AWCA* is the ratio of working capital to sales for each period, where working capital is defined as the difference of current assets and cash minus the difference of liabilities and short-term debt. For each period, actual working capital is then compared to the working capital the company would have if its working capital to sales ratio was kept constant from the previous period. A higher deviation results in a higher AWCA, which we interpret as lower accruals quality and lower audit quality.

We expect that the combination of audit staffing and ICD scope has an effect on audit quality, as expert personnel is well suited to deal with wide-scope ICDs. We test this idea by regressing *AWCA* on ICD scope, audit hours worked by expert personnel, and the interaction effect of the two. In addition to the previously used measures of experts' audit effort, we also use *OvertimePerAuditor* as a measure of an increase in workload for the existing team. We expect that this reflects situations where no expert personnel is added to the audit team, potentially because of capacity constraints, and effort is subsequently increased by increasing the workload of the core audit team. Table 9 displays the results.

[Insert Table 9 here]

Results are in line with expectations. The interaction effects between *#WideScopeICDs* and *HighRankHrs* ($p < 0.01$), *HighSalaryHrs* ($p < 0.05$), and *RAHrs* ($p < 0.05$), respectively, are negative and significant. These findings suggest that increasing the expert audit effort in the presence of wide-scope ICDs increases audit quality by decreasing abnormal accruals. In contrast,

the interaction effect between *#WideScopeICDs* and *OvertimePerAuditor* is significantly positive ($p < 0.10$), suggesting that a workload increase for the existing team decreases audit quality in the presence of wide-scope ICDs. Together, these results suggest that assigning expert personnel to an engagement and increasing audit hours of the existing team do not act as perfect substitutes in the presence of wide-scope ICDs.

5. Conclusion

We analyze how engagement lead partners staff audit engagements in the presence of ICDs with different scope. Previous literature views audit effort as a linear construct, which ignores the heterogeneity in auditor productivity. We expand this literature by exploring the conditions under which engagement partners assign expert personnel to an engagement. Specifically, we argue that engagement partners assign expert personnel to engagements with a higher number of wide-scope ICDs, i.e., entity level and IT-related ICDs.

We test this idea in a proprietary set of audit engagements from Dutch Big 4 firms. In our main analysis, we find that the number of wide-scope ICDs is positively associated with the hours worked by high-ranking auditors, high-salary auditors, certified accountants, and specialists. In contrast, narrow-scope ICDs are not associated with the assignment of such expert personnel. This finding suggests that audit firms view expert personnel as a scarce resource and use this resource in engagements where the marginal utility of doing so is highest. This is the case for wide-scope ICDs as they pose a significant threat to audit quality (e.g., Donelson et al. 2017, Heninger et al. 2018).

Next, we find that the audit effort provided by non-expert personnel is positively associated with both narrow-scope and wide-scope ICDs. This finding suggests that non-expert personnel is sufficient to keep audit quality constant when ICD scope is narrow. It also suggests that wide-scope

ICDs require both specialized skills provided by expert personnel and additional effort, such as increased substantive testing. This is in line with the finding that wide-scope ICDs have consequences in several areas of the firm (e.g., Donelson et al. 2017).

Next, we analyze the relation of ICD scope and the audit workload per auditor. We find that the workload per auditor increases beyond its budget in the presence of ICDs, and that this increase is higher for wide-scope ICDs. In combination with our earlier result, this result suggests that audit teams increase effort in the presence of narrow-scope ICDs by increasing the workload of the existing team rather than by adding expert personnel. In contrast, audit teams react to wide-scope ICDs by both increasing the audit team's workload and adding expert personnel.

Next, we show that the staffing of expert personnel in the presence of wide-scope ICDs is systematically different for first-time audits. While engagement partners generally assign less expert personnel to first-time audits, the assignment of expert personnel is significantly higher in the presence of wide-scope ICDs. This is in line with the finding of previous literature that auditors gain experience and familiarity with the client during an audit (Lee et al. 2009). In contrast, first-time audits require more expert audit effort in order to keep audit quality constant when wide-scope ICDs are present.

Finally, we examine how the combination of ICD scope and audit effort type is related to audit outcomes. We find that audit adjustment rates are significantly higher when expert personnel provides more hours in the presence of wide-scope ICDs. Similarly, we analyze abnormal working capital accruals (AWCA) as an inverse measure of audit quality. We find that the audit effort of expert personnel in the presence of wide-scope ICDs is associated with lower AWCA. In contrast, an increase in the workload of the existing team when wide-scope ICDs are present is associated with a higher AWCA. Combined, these results suggest that the staffing of expert audit personnel dependent on ICD scope influences audit quality.

We contribute to the audit literature in two ways. First, we analyze in detail the production of audit effort as a reaction to internal control issues. Previous studies view audit effort as a single, linear construct. In addition, these studies do not distinguish between audit hours that were budgeted ex ante and additional effort that reflects a reaction to internal control issues. We expand this literature by analyzing different types of audit effort, i.e., the audit effort provided by expert and non-expert personnel.

Second, we are to the best of our knowledge the first to show that the heterogeneity in ICDs leads engagement lead partners to assign different audit personnel to engagements. While literature has analyzed different types of ICDs, it does not investigate how they relate to differences in audit staffing and audit effort reactions. We provide evidence that different types of ICDs require different staffing reactions in order for audit quality to remain constant.

Our study is subject to some limitations. While our data set is highly detailed and allows us to analyze the specifics of the audit process, it is also limited in size and restricted to the Netherlands. While the Dutch setting is unlikely to differ significantly from that of other European countries or the US, we cannot exclude the possibility that some of our results may not be transferable. In addition, we use around 300 observations for our analyses. It is possible that this hinders the statistical power of our models. Finally, abnormal working capital accruals are a simplification of the concept of audit quality. Consequently, the results of this analysis may be limited in their external validity.

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Table 1: Descriptive Statistics

Variable	Min	p25	Mean	Median	p75	Max	Std Dev
#WideScopeICD	0	0	1.25	0	2	11	2.03
HighRankHrs	0	0	1.56	0	3.28	7.98	2.32
HighSalaryHrs	0	0	1.14	0	1.61	7.19	2.00
RAHrs	0	0	1.97	0	4.41	7.44	2.57
SpecialistHrs	0	0	0.50	0	0.89	3.34	0.81
TotalAssets	16.14	17.60	19.12	18.81	20.15	24.25	1.95
ROA	-0.84	0.01	0.03	0.05	0.09	0.45	0.16
CurrentRatio	0.21	1.15	2.47	1.51	2.17	84.50	5.68
Leverage	0.01	0.43	0.58	0.60	0.72	2.77	0.26
EngagementRisk	1	1	1.57	1	2	3	0.74

Notes: Table 1 presents summary statistics for key variables. *#WideScopeICD* is the number of significant internal control deficiencies that are related to the whole entity or IT or both and that were reported for the year. *HighRankHrs* is calculated as the natural logarithm of the total hours that auditors with the rank of director or partner worked on the audit engagement. *HighSalaryHrs* is calculated as the natural logarithm of the total hours worked on the audit engagement by auditors with a yearly salary that is in the top 20% for the audit firm for the year. *RAHrs* is calculated as the natural logarithm of the total hours worked on the audit engagement by auditors who have a registeraccountant (certified accountant) certification. *SpecialistHrs* is calculated as the natural logarithm of the total hours worked on the audit engagement by specialists. Specialists are defined as auditors who are in the highest 30% regarding number of engagements and in the lowest 30% regarding the hours worked per engagement, both measured on the audit firm-year level. *TotalAssets* is defined as the natural logarithm of the client firm's total assets. *ROA* is defined as the client firm's return on beginning-of-period assets. *CurrentRatio* is defined as the client firm's current assets divided by its current liabilities. *Leverage* is calculated as the client firm's total liabilities divided by its total assets. *EngagementRisk* is the ex-ante risk of the audit engagement as noted by the auditor in the engagement file and ranges from 1 (low) to 3 (high).

Table 2: Pearson Correlation Coefficients

Variable	#Wide ScopeICD	Hrs HighRank	Hrs HighSalary	HrsRA	Hrs Specialist	Total Assets	ROA	Current Ratio	Leverage	Engagement Risk
#WideScopeICD	1									
HighRankHrs	0.28***	1								
HighSalaryHrs	0.14***	0.60***	1							
RAHrs	0.17***	0.73***	0.67***	1						
SpecialistHrs	0.30***	0.35***	0.06	0.10**	1					
TotalAssets	-0.06	0.31***	0.29***	0.26***	0.02	1				
ROA	0.03	-0.05	-0.03	-0.02	0.02	0.01	1			
CurrentRatio	-0.03	0.02	-0.03	-0.02	0.09*	-0.03	-0.08	1		
Leverage	-0.12**	0.01	0.04	0.03	-0.10**	0.08*	-0.17***	-0.34***	1	
EngagementRisk	0.08*	0.27***	0.16***	0.15***	0.16***	0.45***	-0.05	0.06	-0.01	1

Notes: Table 2 presents the Pearson correlation coefficients of key variables. *, **, and *** indicate two-tailed significance on the 10%, 5% and 1% level, respectively. *#WideScopeICD* is the number of significant internal control deficiencies that are related to IT, are entity wide, or both and that were reported for the year. *HighRankHrs* is calculated as the natural logarithm of the total hours that auditors with the rank of director or partner worked on the audit engagement. *HighSalaryHrs* is calculated as the natural logarithm of the total hours worked on the audit engagement by auditors with a yearly salary that is in the top 20% for the audit firm for the year. *RAHrs* is calculated as the natural logarithm of the total hours worked on the audit engagement by auditors who have a registeraccountant (certified accountant) certification. *SpecialistHrs* is calculated as the natural logarithm of the total hours worked on the audit engagement by specialists. Specialists are defined as auditors who are in the highest 30% regarding number of engagements and in the lowest 30% regarding the hours worked per engagement, both measured on the audit firm-year level. *TotalAssets* is defined as the natural logarithm of the client firm's total assets. *ROA* is defined as the client firm's return on beginning-of-period assets. *CurrentRatio* is defined as the client firm's current assets divided by its current liabilities. *Leverage* is calculated as the client firm's total liabilities divided by its total assets. *EngagementRisk* is the ex-ante risk of the audit engagement as noted by the auditor in the engagement file and ranges from 1 (low) to 3 (high).

Table 3: Results of Estimating Regression Model 1

Variable	HighRankHrs	HighSalaryHrs	RAHrs	SpecialistHrs
#WideScopeICD	0.23***	0.12**	0.13*	0.11***
TotalAssets	0.31***	0.25***	0.31***	0.02
ROA	-0.81	-0.61	0.03	-0.34
CurrentRatio	0.01	-0.01	-0.01	0.01**
Leverage	-0.28	-0.08	-0.05	-0.14
EngagementRisk	0.60***	0.20	0.16	0.16**
Observations	359	359	359	359
R-squared	44.70%	32.42%	41.36%	27.71%
Fixed effects	Industry, year	Industry, year	Industry, year	Industry, year
Clustered SE	Client firm level	Client firm level	Client firm level	Client firm level

Notes: Table 3 presents the results of estimating regression model 1. *, **, and *** indicate two-tailed significance on the 10%, 5% and 1% level, respectively. † indicates one-tailed significance on the 10% level. *HighRankHrs* is calculated as the natural logarithm of the total hours that auditors with the rank of director or partner worked on the audit engagement. *HighSalaryHrs* is calculated as the natural logarithm of the total hours worked on the audit engagement by auditors with a yearly salary that is in the top 20% for the audit firm for the year. *RAHrs* is calculated as the natural logarithm of the total hours worked on the audit engagement by auditors who have a registeraccountant (certified accountant) certification. *SpecialistHrs* is calculated as the natural logarithm of the total hours worked on the audit engagement by specialists. Specialists are defined as auditors who are in the highest 30% regarding number of engagements and in the lowest 30% regarding the hours worked per engagement, both measured on the audit firm-year level. *#WideScopeICD* is the number of significant internal control deficiencies that are related to IT, are entity wide, or both and that were reported for the year. *TotalAssets* is defined as the natural logarithm of the client firm's total assets. *ROA* is defined as the client firm's return on beginning-of-period assets. *CurrentRatio* is defined as the client firm's current assets divided by its current liabilities. *Leverage* is calculated as the client firm's total liabilities divided by its total assets. *EngagementRisk* is the ex-ante risk of the audit engagement as noted by the auditor in the engagement file and ranges from 1 (low) to 3 (high).

Table 4: Results of Estimating Regression Model 2

Variable	HighRankHrs	HighSalaryHrs	RAHrs	SpecialistHrs
#NarrowScopeICD	0.07	0.05	0.04	0.05**
TotalAssets	0.28***	0.24***	0.29***	0.00
ROA	-0.78	-0.58	0.05	-0.32
CurrentRatio	-0.00	-0.02*	-0.01	0.01**
Leverage	-0.42	-0.11	-0.13	-0.16
EngagementRisk	0.62***	0.19	0.17	0.15*
Observations	359	359	359	359
R-squared	42.70%	32.12%	40.89%	26.52%
Fixed effects	Industry, year	Industry, year	Industry, year	Industry, year
Clustered SE	Client firm level	Client firm level	Client firm level	Client firm level

Notes: Table 4 presents the results of estimating regression model 2. *, **, and *** indicate two-tailed significance on the 10%, 5% and 1% level, respectively. † indicates one-tailed significance on the 10% level. *HighRankHrs* is calculated as the natural logarithm of the total hours that auditors with the rank of director or partner worked on the audit engagement. *HighSalaryHrs* is calculated as the natural logarithm of the total hours worked on the audit engagement by auditors with a yearly salary that is in the top 20% for the audit firm for the year. *RAHrs* is calculated as the natural logarithm of the total hours worked on the audit engagement by auditors who have a registeraccountant (certified accountant) certification. *SpecialistHrs* is calculated as the natural logarithm of the total hours worked on the audit engagement by specialists. Specialists are defined as auditors who are in the highest 30% regarding number of engagements and in the lowest 30% regarding the hours worked per engagement, both measured on the audit firm-year level. *#NarrowScopeICD* is the number of significant internal control deficiencies that are related to accounting issues, are account level, or both and that were reported for the year. *TotalAssets* is defined as the natural logarithm of the client firm's total assets. *ROA* is defined as the client firm's return on beginning-of-period assets. *CurrentRatio* is defined as the client firm's current assets divided by its current liabilities. *Leverage* is calculated as the client firm's total liabilities divided by its total assets. *EngagementRisk* is the ex-ante risk of the audit engagement as noted by the auditor in the engagement file and ranges from 1 (low) to 3 (high).

Table 5: Results of Additional Analysis 1

Variable	LowRankHrs	LowSalaryHrs	LowRankHrs	LowSalaryHrs
#NarrowScopeICD	0.06	0.17**		
#WideScopeICD			0.38***	0.21**
TotalAssets	0.28***	0.33***	0.37***	0.30***
ROA	-1.26	0.11	0.02	-1.29
CurrentRatio	-0.01	-0.01	-0.01	-0.01
Leverage	-0.62	-0.89	-0.84	-0.50
EngagementRisk	0.39**	0.75**	0.78**	0.37**
Observations	359	359	359	359
R-squared	43.62%	28.17%	28.70%	44.89%
Fixed effects	Industry, year	Industry, year	Industry, year	Industry, year
Clustered SE	Client firm level	Client firm level	Client firm level	Client firm level

Notes: Table 5 presents the results of the low rank and low salary personnel analysis. *, **, and *** indicate two-tailed significance on the 10%, 5% and 1% level, respectively. † indicates one-tailed significance on the 10% level. *LowRankHrs* is calculated as the natural logarithm of the total hours that auditors with the rank of staff or manager worked on the audit engagement. *LowSalaryHrs* is calculated as the natural logarithm of the total hours worked on the audit engagement by auditors with a yearly salary that is in the bottom 80% for the audit firm for the year. *#NarrowScopeICD* is the number of significant internal control deficiencies that are related to accounting issues, are account level, or both and that were reported for the year. *#WideScopeICD* is the number of significant internal control deficiencies that are related to IT, are entity wide, or both and that were reported for the year. *TotalAssets* is defined as the natural logarithm of the client firm's total assets. *ROA* is defined as the client firm's return on beginning-of-period assets. *CurrentRatio* is defined as the client firm's current assets divided by its current liabilities. *Leverage* is calculated as the client firm's total liabilities divided by its total assets. *EngagementRisk* is the ex-ante risk of the audit engagement as noted by the auditor in the engagement file and ranges from 1 (low) to 3 (high).

Table 6: Results of Overtime Analysis

Variable	OvertimePerAuditor	
#NarrowScopeICD		3.32***
#WideScopeICD	6.02***	
TotalAssets	5.43**	4.49**
ROA	-11.13	-8.44
CurrentRatio	-2.05***	-2.08***
Leverage	-5.42	-3.13
EngagementRisk	-2.48	-3.85
Observations	312	312
R-squared	28.84%	28.17%
Fixed effects	Industry, year	Industry, year
Clustered SE	Client firm level	Client firm level

Notes: Table 6 presents the results of the auditor workload analysis. *, **, and *** indicate two-tailed significance on the 10%, 5% and 1% level, respectively. † indicates one-tailed significance on the 10% level. *OvertimePerAuditor* is calculated as hours worked by the audit team minus the budgeted hours, divided by the number of auditors who worked on the engagement. *#NarrowScopeICD* is the number of significant internal control deficiencies that are related to accounting issues, are account level, or both and that were reported for the year. *#WideScopeICD* is the number of significant internal control deficiencies that are related to IT, are entity wide, or both and that were reported for the year. *TotalAssets* is defined as the natural logarithm of the client firm's total assets. *ROA* is defined as the client firm's return on beginning-of-period assets. *CurrentRatio* is defined as the client firm's current assets divided by its current liabilities. *Leverage* is calculated as the client firm's total liabilities divided by its total assets. *EngagementRisk* is the ex-ante risk of the audit engagement as noted by the auditor in the engagement file and ranges from 1 (low) to 3 (high).

Table 7: Results of First-Time Audit Analysis

Variable	HighRankHrs	HighSalaryHrs	RAHrs	SpecialistHrs
#WideScopeICD	0.22**	0.11**	0.12*	0.11***
NewAudit	-1.28*	-0.79*	-1.00	-0.17
NewAudit* #WideScopeICD	1.18***	1.18***	1.21***	0.46***
TotalAssets	0.32***	0.26***	0.32***	0.02
ROA	-0.71	-0.45	0.17	-0.26
CurrentRatio	0.00	-0.01	-0.01	0.01**
Leverage	-0.21	0.01	0.03	-0.10
EngagementRisk	0.56***	0.16	0.12	0.14*
Observations	359	359	359	359
R-squared	45.86%	33.83%	42.27%	29.07%
Fixed effects	Industry, year	Industry, year	Industry, year	Industry, year
Clustered SE	Client firm level	Client firm level	Client firm level	Client firm level

Notes: Table 7 presents the results of the first-time audit analysis. *, **, and *** indicate two-tailed significance on the 10%, 5% and 1% level, respectively. † indicates one-tailed significance on the 10% level. *HighRankHrs* is calculated as the natural logarithm of the total hours that auditors with the rank of director or partner worked on the audit engagement. *HighSalaryHrs* is calculated as the natural logarithm of the total hours worked on the audit engagement by auditors with a yearly salary that is in the top 20% for the audit firm for the year. *RAHrs* is calculated as the natural logarithm of the total hours worked on the audit engagement by auditors who have a registeraccountant (certified accountant) certification. *SpecialistHrs* is calculated as the natural logarithm of the total hours worked on the audit engagement by specialists. Specialists are defined as auditors who are in the highest 30% regarding number of engagements and in the lowest 30% regarding the hours worked per engagement, both measured on the audit firm-year level. *#WideScopeICD* is the number of significant internal control deficiencies that are related to IT, are entity wide, or both and that were reported for the year. *NewAudit* is defined as 1 if the audit firm audited the client firm for the first time in this year and 0 otherwise. *#WideScopeICD* is the number of significant internal control deficiencies that are related to IT, are entity wide, or both and that were reported for the year. *TotalAssets* is defined as the natural logarithm of the client firm's total assets. *ROA* is defined as the client firm's return on beginning-of-period assets. *CurrentRatio* is defined as the client firm's current assets divided by its current liabilities. *Leverage* is calculated as the client firm's total liabilities divided by its total assets. *EngagementRisk* is the ex-ante risk of the audit engagement as noted by the auditor in the engagement file and ranges from 1 (low) to 3 (high).

Table 8: Results of Audit Adjustment Analysis

Variable	AuditAdjustmentRate			
#WideScopeICD	-0.01	-0.01	-0.00	0.02
HighRankHrs	-0.02			
HighRankHrs*	0.01**			
#WideScopeICD				
HighSalaryHrs		-0.01		
HighSalaryHrs*		0.01†		
#WideScopeICD				
RAHrs			-0.03**	
RAHrs*			0.01**	
#WideScopeICD				
SpecialistHrs				0.06
SpecialistHrs*				-0.01
#WideScopeICD				
TotalAssets	-0.00	-0.00	0.00	-0.01
ROA	0.13	0.15	0.13	0.18
CurrentRatio	0.01***	0.01***	0.01***	0.01***
Leverage	-0.11	-0.11	-0.09	-0.10
EngagementRisk	0.04	0.03	0.04	0.02
Observations	271	271	271	271
R-squared	13.46%	12.82%	14.07%	12.80%
Fixed effects	Industry, year	Industry, year	Industry, year	Industry, year
Clustered SE	Client firm level	Client firm level	Client firm level	Client firm level

Notes: Table 8 presents the results of the audit adjustment analysis. *, **, and *** indicate two-tailed significance on the 10%, 5% and 1% level, respectively. † indicates one-tailed significance on the 10% level. *AuditAdjustmentRate* is defined as the ratio of adjusted misstatements to all misstatements found by the auditor during the engagement. *HighRankHrs* is calculated as the natural logarithm of the total hours that auditors with the rank of director or partner worked on the audit engagement. *HighSalaryHrs* is calculated as the natural logarithm of the total hours worked on the audit engagement by auditors with a yearly salary that is in the top 20% for the audit firm for the year. *RAHrs* is calculated as the natural logarithm of the total hours worked on the audit engagement by auditors who have a registeraccountant (certified accountant) certification. *SpecialistHrs* is calculated as the natural logarithm of the total hours worked on the audit engagement by specialists. Specialists are defined as auditors who are in the highest 30% regarding number of engagements and in the lowest 30% regarding the hours worked per engagement, both measured on the audit firm-year level. *#WideScopeICD* is the number of significant internal control deficiencies that are related to IT, are entity wide, or both and that were reported for the year. *TotalAssets* is defined as the natural logarithm of the client firm's total assets. *ROA* is defined as the client firm's return on beginning-of-period assets. *CurrentRatio* is defined as the client firm's current assets divided by its current liabilities. *Leverage* is calculated as the client firm's total liabilities divided by its total assets. *EngagementRisk* is the ex-ante risk of the audit engagement as noted by the auditor in the engagement file and ranges from 1 (low) to 3 (high).

Table 9: Results of Abnormal Working Capital Accrual Analysis

Variable	AbsAWCA			
#WideScopeICD	48.93**	15.23*	43.87*	-17.06
HighRankHrs	30.2			
HighRankHrs*	-18.57***			
#WideScopeICD				
HighSalaryHrs		42.34		
HighSalaryHrs*		-16.78**		
#WideScopeICD				
RAHrs			25.54	
RAHrs*			-16.86**	
#WideScopeICD				
OvertimePerAuditor				-1.64*
OvertimePerAuditor *				0.54*
#WideScopeICD				
TotalAssets	89.13***	76.37***	89.81***	76.47**
ROA	337.89	304.12	315.31	320.41
CurrentRatio	-3.65	-3.79	-2.52	-13.39
Leverage	-195.73	-218.12	-211.41	-219.13
EngagementRisk	100.93**	116.75**	111.50**	136.49**
Observations	279	279	279	241
R-squared	39.37%	38.34%	39.00%	35.59%
Fixed effects	Industry, year	Industry, year	Industry, year	Industry, year
Clustered SE	Client firm level	Client firm level	Client firm level	Client firm level

Notes: Table 9 presents the results of the audit adjustment analysis. *, **, and *** indicate two-tailed significance on the 10%, 5% and 1% level, respectively. † indicates one-tailed significance on the 10% level. *AbsAWCA* is defined as the absolute value of the abnormal working capital accruals of the client firm in million $. *HighRankHrs* is calculated as the natural logarithm of the total hours that auditors with the rank of director or partner worked on the audit engagement. *HighSalaryHrs* is calculated as the natural logarithm of the total hours worked on the audit engagement by auditors with a yearly salary that is in the top 20% for the audit firm for the year. *RAHrs* is calculated as the natural logarithm of the total hours worked on the audit engagement by auditors who have a registeraccountant (certified accountant) certification. *OvertimePerAuditor* is calculated as hours worked by the audit team minus the budgeted hours, divided by the number of auditors who worked on the engagement. *#WideScopeICD* is the number of significant internal control deficiencies that are related to IT, are entity wide, or both and that were reported for the year. *OvertimePerAuditor* is calculated as hours worked by the audit team minus the budgeted hours, divided by the number of auditors who worked on the engagement. *TotalAssets* is defined as the natural logarithm of the client firm's total assets. *ROA* is defined as the client firm's return on beginning-of-period assets. *EngagementRisk* is the ex-ante risk of the audit engagement as noted by the auditor in the engagement file and ranges from 1 (low) to 3 (high).