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Auditors' workload and audit quality under audit hour budget pressure: Evidence from the Korean audit market

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By utilizing unique audit hour (actual and budgeted) data from Korea, this study examines the impact of auditors' workload on audit quality under audit hour budget pressure. We find the intensity of auditor workload has a negative impact on audit quality when total audit hours exceed budgeted hours (i.e., unfavourable budget variance). When we breakdown the audit workload by auditor level, we find partner workload has a negative impact on audit quality regardless of the budget variance, while senior auditor workload negatively affects audit quality only when the budget variance is unfavourable. We cautiously interpret our empirical findings to suggest that stress and burnout caused by increased audit hours under budget pressure can compel auditors to engage in behaviours that undermine audit quality.

KEYWORDS
audit fee pressure, audit hour, audit quality, auditor's workload, budget variance

1 | INTRODUCTION

Using unique audit hour data from Korea, we examine how auditors' workload under audit hour budget pressure impacts audit quality. Prior studies document a trade-off between budgeted audit hours and audit quality (Ettredge et al., 2008; Liyanarachchi & McNamara, 2007; Otley & Pierce, 1996; Pierce & Sweeney, 2004), which resonates with the concerns of professional accounting organizations (Commission on Auditors' Responsibilities, 1978; National Commission on Fraudulent Financial Reporting, 1987).

Driven by intensified competition in recent audit markets, audit firms are cutting their audit fees to stay competitive, which, in turn, affects audit practice in the form of reduced budgeted audit hours (Houston, 1999). The budget pressure caused by reduced audit fees can eventually affect audit firms' overall audit quality negatively. For example, under budget pressure, auditors may need to omit or reduce planned tests in order to complete assigned audit tasks on time, or auditors may need to work more unreported hours to improve documented efficiency, which can increase the auditor workload. However, stress caused by budget pressure and workload can increase an auditor's level of anxiety and depression, which can then have adverse organizational consequences (Gaertner & Ruhe, 1981).

One of the challenges that researchers face in examining the relation between audit quality and auditor workload under budget pressure arises from the fact that those constructs are hard to measure, since the budgeted and actual audit hour data whose difference is often used as a proxy for workload pressure are not publicly available. To overcome this data availability issue, most prior studies have used empirical proxies in measuring workload pressure or have relied on survey or experimental research methods. For example, Broberg et al. (2017) use survey data to examine the relation between audit budget pressure and audit quality in Sweden.[1] McDaniel (1990) adopts an experimental method to investigate auditor time pressure and audit performance. Goodwin and Wu (2016) use the number of listed clients in an audit partner's client portfolio to measure the audit partner's busyness in Australia as a proxy for the workload. In addition, López and Peters (2012) use an audit firm's busy season as a proxy for workload pressure. These studies' research methods are advantageous when budgeted audit hours and workload data for individual auditors are not available. However, these methods have limitations from a research design perspective, such as nonresponse bias or misleading bias in survey method studies, confidentiality issues in experimental studies and poor proxy issues in empirical archival studies.

In this study, we utilize the actual audit hours and number of auditors by client firm as reported by publicly traded companies in

Korea from 2015 to 2016. In addition, we obtain proprietary budgeted audit hour data from the Korean Institute of Certified Public Accountants (KICPA). These data sets provide unique research setting which allows us more directly to examine auditor workload pressure and its effect on audit quality.

We first find a negative relation between auditor workload and audit quality only when total reported audit hours exceed budgeted audit hours (i.e., unfavourable budget variance). However, we do not find such evidence in the entire sample. The results are consistent with our hypothesis that stress and burnout caused by increased audit hours lead auditors to engage in quality-threatening behaviour, thus negatively affecting the engagement team's collective performance. This finding also suggests that the association between auditor workload and audit quality is mainly driven by audit firms whose actual audit hours exceed budgeted audit hours, implying that auditors' increased audit hours cannot improve audit quality but that increased audit hours under budget pressure can deteriorate audit quality.

Since the auditor level in the engagement team can have a different impact on auditors' incentives, we analyse the impact of the workload on audit quality by auditor level, namely, partners versus senior auditors. Overall, we find that partners' workload and audit quality are negatively associated, and the audit hour budget variance does not affect the association. On the other hand, senior auditor workload does not seem to affect audit quality. It rather affects audit quality negatively when the audit hour budget variance is unfavourable. This finding supports our hypothesis that auditor level has different implications for the relation between auditor workload pressure and audit quality.

Our study makes four primary contributions. First, we extend the audit literature that examines the impact of audit efforts on audit quality. Although a long line of literature documents a positive relation between audit effort and audit quality, most prior studies ignore the negative effects of auditor stress and burnout associated with audit efforts or auditor workload (Bedard & Johnstone, 2004; Brumfield et al., 1983; Charles et al., 2010). López and Peters (2012) is one of the few studies that consider auditors' potential stress and burnout in examining their workload pressures and audit quality. However, López and Peters (2012) use auditors' busy season as a proxy for their increased workload, which may not accurately measure auditor workload. Our study complements their findings by directly measuring individual auditor workload based on actual and budgeted audit hours at the engagement level.

Second, this paper highlights the effect of budgeted audit hours (or budget variance) on audit quality. Ettredge et al. (2008) document asymmetric budget ratcheting in audit firms under audit fee pressure. Their findings suggest that audit firm managers tend to have an incentive to control costs under budget pressure by reducing audit budget hours, which can compromise audit quality. We extend the work of Ettredge et al. (2008) by providing empirical evidence that audit hour budget variance is another important factor that affects the relation between auditor workload and audit quality.

Third, our empirical analyses by auditor level on the engagement team can have a practical implication for audit planning, specifically staffing for the audit engagement. Goodwin and Wu (2016) recently find that a partner's busyness as proxied by the partner's number of engagements does not impair audit quality in Australia. However, we find that the partner workload pressure can negatively affect audit quality when the workload pressure is measured by the partner's actual audit hours per engagement. In addition, we find auditor workload pressures have a negative impact on audit quality, regardless of auditor level when the actual audit hours exceed the budgeted audit hours. This result implies that adequate staffing can mitigate the negative impact of workload pressure on audit quality by decreasing stress and burnout associated with the excessive workload.

Finally, the required disclosure of auditor workload in Korea has an important policy implication. In recent years, the Public Company Accounting Oversight Board (PCAOB) has expressed its concern that auditor workload can negatively affect audit quality. For example, the PCAOB's (2014, p. 26) Standing Advisory Group has recommended that 'measurements of staff workload could be monitored to highlight potential risks to audit quality, such as situations in which partner or staff workloads might impair those individuals' abilities to accomplish their assignments effectively'. In addition, the Center for Audit Quality (2014) has recommended that the engagement team members' workloads be available to the client firm's audit committee as an audit quality indicator. Therefore, our findings, based on the Korean audit market, can provide useful information to the PCAOB regarding the detailed disclosure of audit hours and its impact on audit quality.

Unlike the PCAOB in the United States, Korean regulators are concerned more about decreases in audit effort engendered by low audit fees and try to make sure that audit firms have sufficient personnel, following the International Standard on Quality Control (paragraph 29).[2] However, the negative effect of individual auditors' heavy workload on audit quality has not yet been considered in Korea. Findings in this study will help Korean audit market regulators in their effort to come up with the detailed guidelines on auditor workload disclosure requirements.[3]

The remainder of the study is organized as follows. In Section 2, we briefly discuss the Korean audit market and prior studies and develop our hypotheses. Section 3 presents our research design. In Section four, we discuss our empirical results. In Section 5, we discuss additional test results. We provide our concluding remarks in Section 6.

2 | BACKGROUND AND HYPOTHESIS DEVELOPMENT

2.1 | The Korean audit market

The Korean capital market has exhibited rapid growth in the past few decades. However, the lack of market transparency and accountability has often been pointed out as the greatest potential threat to the Korean economy. Many economists believe such a lack of market transparency contributed to the financial crisis in Korea in the late 1990s. Since then, in an effort to become more aligned with global

standards in the capital market, Korean financial regulators—the Financial Supervisory Commission (FSC) and the Financial Supervisory Service (FSS)—have started to deregulate the audit market as part of institutional and policy reforms.[4] One of the key policy changes in the audit market is that audit fees are now to be determined by contracts between auditors and client firms (Park et al., 2010).[5]

Audit firms in Korea provide a wide range of non-audit services as well. However, in recent years, audit firms' revenue from non-audit services relative to total revenues has notably increased.[6] The increase in non-audit service fees for audit firms has mainly come from consulting services related to the restructuring of Korean firms during the period of recovery from the financial crisis and the mandated adoption of the International Financial Reporting Standards in 2011. A recent study also documents that audit firms in Korea strategically choose non-audit services that are more profitable than traditional audit services (Choi & Yoon, 2014).

Audit market deregulation combined with heavy reliance on non-audit services as a revenue source has intensified competition in the Korean audit market. This increased competition negatively affected audit firms' audit fee revenues and consequently changed audit firms' profit structure. The practice of low-balling has become more common in the audit market since the early 2000s. Kim and Ko (2017) document that the audit fees in Korea are, on average, only 29% (27%) of the audit fees in the United States, when audit fees relative to total assets (total revenue) are compared. They also find that Korean firms' audit fees are 42% lower than those in the United States, even after controlling for other factors known to affect audit fees. However, audit firms tend to make up for the reduced profit margin or even losses from the audit service with higher profits from their increased amount of non-audit services.

Korean regulators have adopted a number of unique provisions regarding mandated disclosures to mitigate the negative effects of the lower audit fees due to intensified competition. For example, client firms have been required to provide information about total audit hours, as well as audit fees since 2003. In addition, regulators require firms to disclose the detailed audit hours and number of auditors by each auditor level in the engagement team in the audit report section of their annual reports starting 2015.

2.2 | Literature review and hypothesis development

Audit firms in a highly competitive market are more likely to face significant audit fee pressure due to price competition (Green & Barrett, 1994; Houston, 1999). To stay competitive and profitable in a competitive audit market, audit firms strategically underprice their audit fees to acquire more client firms (DeAngelo, 1981). These fee pressures can create incentives for audit firms to emphasize cost control by reducing budgeted audit hours. Houston (1999) documents that audit firms reduce budgeted audit hours in response to fee pressure, which can lead to an increase in audit risk. Prior studies document that the prevalence of budget pressure from the reduction in budget hours is negatively associated with audit quality, since it affects engagement team behaviours such as premature sign-offs on audit steps (DeZoort & Lord, 1997; McDaniel, 1990; Pierce & Sweeney, 2004). In particular, Ettredge et al. (2008) document asymmetric budget ratcheting in audit firms. In other words, audit firms tend to remove excess budgeted audit hours compared to actual audit hours (i.e., favourable variance) in the next period, whereas they are not likely to increase budgeted audit hours when actual engagement hours exceed budgeted hours (i.e., unfavourable variance). The findings of Ettredge et al. (2008) imply that audit firms' cost control through budget pressure can be a common strategy, because they are less likely to pass on costs for additional audit time to client firms.

Audit firms' cost control in response to audit fee pressure can affect their risk assessment of audit clients. One line of literature documents that audit efforts are related to audit firms' risk assessment of audit clients (Agoglia et al., 2010; Allen et al., 2006; Brumfield et al., 1983; Mueller & Anderson, 2002). Bedard and Johnstone (2004) find that auditors plan more extensive testing in the presence of earnings manipulation risk. Charles et al. (2010) document that auditors increase audit effort to reduce detection risk when client firms have more accounts and disclosures that are likely to be manipulated, by examining the relation between audit fees and the risk of material misstatement.

On the other hand, a different line of research reports the absence of a strong relation between client risk and audit programs (Fargher et al., 2005; Gibbins & Trotman, 2002; Mock & Wright, 1999). In particular, audit firms lower their risk assessments and audit effort in the presence of audit fee pressure (Houston, 1999). Under audit fee pressure, audit firms can maintain audit quality and mitigate their exposure to client risk by improving efficiency through cost control.

However, audit firms' emphasis on cost control in an effort to improve audit efficiency can have a negative impact on audit effectiveness. López and Peters (2012) find that workload pressure from audit hour budget constraints caused by audit fee pressure impair auditors' capacity to discover and report accounting exceptions. Their findings are consistent with prior experimental and survey-based studies that document a negative relation between auditor fatigue and audit quality (Coram et al., 2004; Kelley & Margheim, 1990; Sweeney & Summers, 2002). Ettredge et al. (2008) also document that auditors work more intensively including unreported overtime, which can eventually result in auditor job dissatisfaction, burnout and turnover.

In this study, we leverage unique audit hour disclosures in the Korean audit market to examine how auditor workload pressure affects audit quality. As discussed earlier, listed companies in Korea are required to disclose their audit reports, including the number of engagement auditors and their actual audit hours by auditor level, which enables us to measure the actual audit hours per auditor for each audit engagement as a proxy for workload pressure. Since total audit fees are based on budgeted audit hours and hourly rates are set fairly uniformly across all audit engagements, the actual audit hours

do not directly affect audit fees in the Korean audit market (Jeon & Park, 2016). That is, when actual audit hours exceed budgeted audit hours (i.e., unfavourable budget variance), the engagement team's actual audit hours over those budgeted are not likely to be compensated. Therefore, we expect unfavourable budget variance under audit fee pressure and audit firms' tight cost control can affect the level of fatigue and stress of individual auditors.

Such stress and burnout can lead auditors to engage in quality-threatening behaviour, thus negatively affecting the engagement team's collective performance especially when the actual audit hours exceed the budgeted audit hours. Based on the discussion above, we state our first hypothesis as follows.

H1. Auditor workload is negatively associated with audit quality when audit hour budget variance is unfavourable.

In the second set of hypotheses, we examine how the auditor level can affect the relation between auditor workload and audit quality. Audit firms' allocation and mix of their labour (i.e., partners vs. senior auditor) vary with engagement characteristics (Hackenbrack & Knechel, 1997). Even though the engagement team's collective workload could affect audit quality, especially when the actual audit hours exceed the budgeted hours, the effect of each auditor's workload within the engagement team (i.e., partner or senior auditor) on audit quality might not be uniform.

There exist two opposing views on the partner workload pressure related to audit quality. On one hand, a partner workload can be positively associated with audit quality, because a partner with a larger client and hence more audit hours is more likely to be perceived as credible and proficient (Goodwin & Wu, 2016; Knechel et al., 2013). On the other hand, since partners are involved with multiple engagements, their attention to each engagement could be reduced, which can negatively affect audit quality according to limited attention theory (Simon, 1979). Therefore, the association between the partner workload and audit quality is unclear ex ante. We propose the following nondirectional null hypothesis.

H2-1. The audit partner workload has no effect on audit quality.

Bierstaker and Wright (2001) document that audit firm managers tend to reduce the budget hours of experienced staff under fee pressure because greater efficiency gains are expected from reducing the budgeted hours of senior staff. Furthermore, under risk-based auditing, audit firms tend to assign high-risk audit tasks to senior staff, which can put senior staff in more stressful situations (Bills et al., 2016; Bowlin, 2011). Therefore, higher workload combined with unfavourable audit budget variance can increase the stress and burnout levels and turnover of senior staff, which can have a negative impact on audit quality. We thus propose our final hypothesis as follows.

H2-2. Senior auditor workload has a negative effect on audit quality when the audit engagement budget variance is unfavourable.

3 | RESEARCH DESIGN AND SAMPLE SELECTION

3.1 | Research design

To examine the impact of the workload pressure and audit hour budget variances on audit quality, we use the following ordinary least squares regression model:[7]

$$\begin{aligned} Absda_{i,t} = {} & a_0 + a_1 * WL_{i,t} + a_2 * Bugtvar_{i,t} + a_3 * Chfee_{i,t} + a_4 * Firmsize_{i,t} \\ & + a_5 * Salesgrth_{i,t} + a_6 * Cfo_{i,t} + a_7 * Ploss_{i,t} + a_8 * Leverage_{i,t} \\ & + a_9 * Tenure_{i,t} + a_{10} * Seg_{i,t} + a_{11} * Cimp_{i,t} + a_{12} * Big4_{i,t} + a_{13} \\ & * Age_{i,t} + a_{14} * Qcah_{i,t} + a_{15} * Issue_{i,t} + a_{16} * Nclient_{i,t} + a_{17} \\ & * Expert_{i,t} + a_{18} * Year\ Dummy_{i,t} + e_{i,t} \end{aligned} \quad (1)$$

Since one of our key variables, audit quality, is unobservable, we use client firm earnings quality to measure audit firm audit quality, following prior studies (Choi et al., 2010; Francis & Yu, 2009; Higgs & Skantz, 2006; Lim & Tan, 2008). More specifically, we use discretionary accruals in absolute terms to proxy for audit quality. We compute discretionary accruals using the abnormal accruals model proposed by Jones (1991) and modified by Kothari et al. (2005), which adjusts for financial performance by adding return on assets to the accruals model:

$$\begin{aligned} TA_{i,t} = {} & a_0 + a_1{}^*(1/ASSETS_{i,t-1}) \\ & + a_2{}^*\{(\Delta SALE_{i,t} - \Delta AR_{i,t})/ASSETS_{i,t-1})\} \\ & + a_3{}^*(PP\&E_{i,t}/ASSETS_{i,t-1}) + a_4{}^*ROA_{i,t} + e_{i,t} \end{aligned} \quad (2)$$

where $TA_{i,t}$ denotes total accruals, measured change in non-cash current assets minus the change in current liabilities excluding the current portion of long-term debt minus depreciation and amortization and scaled by lagged total assets. $ASSETS_{i,t-1}$ denotes lagged total assets; $\Delta SALE_{i,t}$ is the change in net sales; $\Delta AR_{i,t}$ is the change in accounts receivable; $PP\&E_{i,t}$ is gross property, plant and equipment; and $ROA_{i,t}$ is income before extraordinary items scaled by lagged total assets. We estimate regression Equation (2 by two-digit Standard Industrial Classification (SIC) codes and fiscal years. The absolute value of the error term, $e_{i,t}$ ($Absda_{i,t}$), is the dependent variable of Equation (1).

Our independent variable of interest, WL_{ALL}, captures auditor workload pressure, measured by the total number of hours worked by each individual auditor for each audit engagement. We measure auditor workload pressure by taking the logarithm of the total number of audit hours divided by the total number of auditors at the client–audit firm level. We also calculate auditor workload by auditor level, that is, for partners, senior auditors (non-partner auditors with more than 2 years of experience) and staff auditors, denoted by WL_{PT}, WL_{SN} and

WL_{ST}, respectively. Even though audit hours are disclosed by the partner, senior auditor and staff auditor, our subsample analysis does not include the staff auditor subsample, because many client firms are audited only by partners and senior auditors in Korea. Audit hour budget variance is computed as the reported (actual) audit hours minus budgeted audit hours scaled by budgeted audit hours ($Budgvar_{i,t}$).

Equation (1) includes other control variables that are known to affect a firm's discretionary accruals, and they are defined as follows: $Chfee_{i,t}$ is annual changes in audit fees; $Salesgrth_{i,t}$ is sales growth rate over the previous year, as a percentage; $Firmsize_{i,t}$ is the natural logarithm of the firm's total assets; $Cfo_{i,t}$ is the operating cash flow divided by total assets; $Ploss_{i,t}$ is an indicator variable that takes the value of one when a firm reports a negative net income during any of two prior years ($t-1$ or $t-2$), and zero otherwise; $Leverage_{i,t}$ is total liabilities divided by total assets; $Tenure_{i,t}$ is the duration of the auditor–client relationship in years; $Seg_{i,t}$ is the number of segments; $Cimp_{i,t}$ is the client's importance for each audit firm, measured as the natural logarithm of the client's audit fee divided by the sum of all the audit firm's clients' audit fees; $Big4_{i,t}$ is an indicator variable set to one when the auditor is a Big 4 firm, and zero otherwise; $Age_{i,t}$ is the number of years since the client firm was incorporated; $Qcah_{i,t}$ is the ratio of the auditor's quality control hours to total audit hours, which controls for the effect of the audit firm's quality control efforts; $Issue_{i,t}$ is an indicator variable that takes the value of one if the change in financial cash flow is positive in the current year, and zero otherwise;[8] $Nclient_{i,t}$ is the number of clients audited by the same auditor during each calendar year; and $Expert_{i,t}$ is the auditor's industry specialization indicator variable, which takes the value of one if an auditor audits more than 30% of audit clients in a two-digit SIC code industry each year, and zero otherwise (Bills et al., 2015; Minutti-Meza, 2013).

To test our hypotheses, we split our sample by budget variance—favourable versus unfavourable—and compare the effect of the workload variable on audit quality in these two subsamples. Our hypotheses H1 and H2-2 predict that the workload will negatively affect audit quality in the unfavourable variance subsample.[9]

3.2 | Sample selection

We first identify a total of 4372 firm–year observations listed in the two major equity markets in Korea, the Korea Composite Stock Price Index (KOSPI) and Korea Securities Dealers Automated Quotations (KOSDAQ) in 2015 and 2016. Listed Korean firms have been required to disclose audit hours and the number of auditors by their level starting in 2015. However, since one of our key variables, budgeted audit hours, obtained from a proprietary data source (i.e., KICPA), is available only in 2015 and 2016, our sample period spans from 2015 to 2016.

We first merge the firm–year observations of listed companies with data on audit information retrieved from TS2000.[10] During this process, we lose 528 firm–year observations. We eliminate 411 observations in the utilities or financial industries. We also eliminate 74 non-December firms to mitigate the effect of audit busyness at the end of the year. In the process of constructing control variables, we remove 649 observations due to data missing from TS2000. When the budgeted audit hour data obtained from KICPA are merged with these selected observations, we lose additional 481 firm–year observations.

In the final step, we hand-collect the actual audit hours expended by each level of auditors (partners, senior auditors and staff auditors) and the number of auditors in each level from annual reports obtained through the Korean electronic corporate filing and disclosure system (Data Analysis, Retrieval and Transfer System). The final sample consists of 2299 firm–year observations with 1217 unique firms. Table 1 summarizes the sample selection process.

4 | RESULTS

4.1 | Data description

Table 2 presents our descriptive statistics. On average, for each audit engagement, each partner spends 117.4 h (WL_{PT}), each senior auditor 193.6 h (WL_{SN}) and each staff auditor 135.2 h (WL_{ST}). However, only about 19.2% of the audit engagements in our sample were completed within the budgeted audit hours ($Favor = 1$), which is consistent with the work of Ettredge et al. (2008). The median audit hour budget variance (*Budgvar*) is 23.8%, which is unfavourable variance. The annual audit fee (*Chgfee*) increases by about 11.9%, while 47.2% of client firms are audited by Big 4 firms (*Big4*). On average, the auditor–client relationship (*Tenure*) lasts for about 5.6 years.

Table 3 provides the correlation coefficients among our key variables and control variables in the multivariate analysis.[11] In a univariate sense, we find a positive relation between abnormal accruals in absolute terms (*Absda*) and partners' workload pressure (WL_{PT}), which implies that, when audit partners are under time pressure, client firms

TABLE 1 Sample selection

	Observations	Unique firms
Listed companies' firm–year observations, 2015–2016	4372	2123
Less: observations missing from the TS 2000 database	(528)	(235)
Less: utilities and financial firms	(411)	(215)
Less: non-December year-end firms	(74)	(36)
Less: data missing for constructing control variables	(649)	(210)
Less: data missing for budget variance	(481)	(210)
Total available observations	2299	1217

Note: This table describes our sample selection process for firms listed in the two Korean stock exchanges Korea Composite Stock Price Index (KOSPI) and Korea Securities Dealers Automated Quotations (KOSDAQ) in 2015 and 2016.

TABLE 2 Summary statistics

Variable	N	p25	Mean	Median	p75
Absda	2299	0.020	0.063	0.042	0.081
WL_{ALL}	2299	101.714	167.897	144.800	200.500
WL_{PT}	2299	43.000	117.427	80.000	162.000
WL_{SN}	2299	118.667	193.588	164.000	230.000
WL_{ST}	1511	66.571	135.193	100.167	162.800
Favor	2299	0.000	0.192	0.000	0.000
Budgvar	2299	0.025	0.597	0.238	0.586
Chfee	2299	0.000	0.119	0.000	0.053
Firmsize	2299	18.145	19.072	18.804	19.650
Salesgrth	2299	−0.076	0.088	0.029	0.140
Cfo	2299	0.004	0.047	0.052	0.097
Ploss	2299	0.000	0.394	0.000	1.000
Leverage	2299	0.211	0.379	0.370	0.532
Tenure	2299	2.000	5.592	5.000	8.000
Seg	2299	1.000	1.900	2.000	3.000
Cimp	2299	0.653	0.726	0.711	0.788
Big4	2299	0.000	0.472	0.000	1.000
Age	2299	2.890	3.254	3.258	3.738
Qcah	2299	0.011	0.019	0.015	0.023
Issue	2299	0.000	0.454	0.000	1.000
Nclient	2299	0.693	1.607	1.609	2.485
Expert	2299	0.000	0.202	0.000	0.000

Note: This table reports descriptive statistics. The list of variable definitions is in the Appendix. Since a few of our key variables in our regressions are log-transformed, we report the raw numbers in these summary statistics. Those variables are redefined as follows:

WL_{ALL} Total workload, measured by the total number of actual audit hours divided by the number of all auditors

WL_{PT} Total workload measured by the total number of actual audit hours worked by partners divided by the number of partners

WL_{SN} Total workload measured by the total number of actual audit hours worked by senior auditors divided by the number of senior auditors

WL_{ST} Total workload measured by the total number of actual audit hours worked by staff auditors divided by the number of staff auditors

report a lower quality of earnings or audit quality. However, we do not find similar correlations between abnormal accruals (*Absda*) and other auditor workload pressure (i.e., senior and staff auditors), at least in a univariate sense. In addition, abnormal accruals (*Absda)* are positively correlated with budget variance (*Budgvar*). We do not observe any other high correlations among our independent variables that could pose any serious collinearity issues. In the multivariate analysis setting, we will examine the interaction effect of the budget variance and workload pressure on audit quality, which is the focus of our study.

4.2 | Empirical results

Table 4 provides the regression results for H1. Many control variables load in the expected direction. For example, small firms (*Firmsize*), fast-growing firms (*Salesgrth*), firms with low operating cash flow (*Cfo*) and loss firms (*Ploss*) have low audit quality across all subsamples.

In general, we find no supporting evidence that auditor workload pressure has any impact on audit quality (coeff. = 0.006, *t*-stat. = 1.40, Colum (1)). The coefficient for *Budgvar* is positive and statistically significant at less than the 1% level (coeff. = 0.005, *t*-stat. = 3.27), which indicates that, when actual audit hours exceed budgeted audit hours, audit quality deteriorates, consistent with prior studies (e.g., Houston, 1999). However, when audit firms have unfavourable audit hour budget variance (i.e., *Favor* = 0), we find evidence that audit quality decreases as auditor workload pressure increases (coeff. = 0.014, *t*-stat. = 3.24, Column (3)).[12] On the other hand, when the audit hour budget variance is favourable (*Favor* = 1), the coefficient for the workload is nonsignificant (coeff. = −0.005, *t*-stat. = −0.68). Overall, the results in Table 4 support H1; that is, auditor workload pressure affects audit quality negatively when the audit hour budget variance is unfavourable.

While Table 4 is based on total audit hours spent by all auditors, Table 5 provides the regression results for H2-1, where we focus on the partner workload. Overall, we document that the workload pressure at the partner level negatively affects audit quality

TABLE 3 Pearson and Spearman correlations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(11)
(1) Absda		0.007	0.024	−0.009	−0.010	*0.035*	0.033	**−0.147**	0.014	**0.115**
(2) WL_{ALL}	0.004		**0.654**	**0.906**	**0.754**	**0.151**	0.027	0.313	−0.025	**0.075**
(3) WL_{PT}	*0.038*	**0.669**		**0.443**	**0.397**	0.029	0.008	**0.160**	−0.019	**0.053**
(4) WL_{SN}	−0.020	**0.920**	**0.473**		**0.529**	**0.181**	**0.050**	**0.360**	−0.021	**0.064**
(5) WL_{ST}	−0.027	**0.782**	**0.446**	**0.592**		**0.236**	0.038	**0.372**	0.000	0.038
(6) Budgvar	**0.179**	**0.116**	**0.045**	**0.120**	**0.134**		**0.123**	**0.159**	**0.088**	−0.004
(7) Chfee	**0.096**	0.015	−0.019	0.034	0.019	**0.175**		**0.075**	**0.066**	0.007
(8) Firmsize	**−0.163**	**0.453**	**0.258**	**0.486**	**0.470**	**−0.048**	−0.012		0.024	**−0.139**
(9) Salesgrth	**0.075**	−0.020	−0.010	−0.021	−0.009	**0.069**	0.015	−0.015		**−0.074**
(10) Cfo	**−0.188**	−0.006	−0.029	0.011	−0.011	0.023	−0.031	**0.156**	**0.073**	**−0.314**
(11) Ploss	0.130	0.070	**0.049**	**0.059**	0.039	−0.022	−0.019	**−0.120**	*0.036*	
(12) leverage	**0.093**	0.266	**0.168**	**0.257**	**0.231**	0.021	0.023	**0.264**	−0.006	**0.310**
(13) tenure	**−0.092**	**−0.007**	**−0.052**	0.019	0.050	**−0.102**	**−0.056**	**0.196**	**−0.058**	−0.022
(14) Seg	−0.004	**−0.054**	−0.018	**−0.061**	**−0.064**	−0.008	0.025	**−0.086**	**0.054**	0.028
(15) Cimp	0.015	**0.377**	**0.424**	**0.279**	**0.233**	**−0.079**	−0.025	−0.002	−0.018	**0.080**
(16) Big4	**−0.070**	**−0.225**	**−0.365**	**−0.089**	0.029	0.030	**0.093**	**0.368**	**−0.050**	**−0.061**
(17) age	**−0.149**	**0.104**	**0.101**	**0.100**	**0.079**	**−0.256**	**−0.152**	**0.257**	**−0.050**	**0.063**
(18) Qcah	**0.105**	**−0.134**	**0.049**	**−0.171**	**−0.181**	**0.062**	**−0.049**	**−0.271**	**0.109**	−0.020
(19) issue	**0.113**	0.027	**0.076**	0.006	0.015	**0.051**	0.004	0.004	**0.059**	0.009
(20) Nclient	−0.016	**−0.176**	**−0.303**	**−0.078**	−0.005	**0.058**	**0.063**	**0.219**	**−0.048**	**−0.055**
(21) expert	**−0.041**	−0.012	**−0.106**	**0.046**	**0.127**	0.016	0.021	**0.333**	−0.014	**−0.049**

Note: This table reports the Pearson (above the diagonal) and Spearman (below the diagonal) correlation coefficients among the variables in the study. Bold (italic) font indicates a statistical significance of at least 5% (10%). The list of variable definitions is in Appendix A.

TABLE 3 (Continued)

	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
(1) Absda	**0.062**	**−0.076**	0.007	0.007	**−0.049**	**−0.117**	**0.044**	**0.100**	0.007	0.023
(2) WL_{ALL}	**0.261**	−0.038	**−0.075**	**0.490**	**−0.282**	**0.109**	**−0.205**	0.033	**−0.234**	**−0.049**
(3) WL_{PT}	**0.173**	**−0.066**	−0.036	**0.528**	**−0.385**	**0.106**	0.025	**0.075**	**−0.326**	**−0.118**
(4) WL_{SN}	**0.256**	−0.015	**−0.082**	**0.365**	**−0.140**	**0.106**	**−0.259**	0.012	**−0.124**	**0.008**
(5) WL_{ST}	**0.230**	0.028	**−0.089**	**0.339**	−0.004	**0.098**	**−0.264**	0.033	−0.046	**0.122**
(6) Budgvar	**0.147**	−0.016	−0.010	**−0.138**	**0.270**	**−0.072**	**−0.168**	**0.068**	**0.185**	**0.163**
(7) Chfee	**0.106**	**0.055**	0.001	−0.024	**0.142**	−0.016	**−0.070**	**0.057**	**0.085**	**0.080**
(8) Firmsize	**0.282**	**0.194**	**−0.088**	−0.001	**0.344**	**0.302**	**−0.343**	−0.003	**0.202**	**0.267**
(9) Salesgrth	0.003	−0.027	−0.002	−0.031	0.014	**−0.067**	0.022	**0.082**	0.020	**0.050**
(10) Cfo	**−0.169**	**0.059**	**−0.048**	**−0.045**	**0.088**	0.028	*−0.038*	**−0.148**	**0.093**	**0.043**
(11) Ploss	**0.304**	−0.024	0.025	**0.083**	**−0.061**	**0.050**	0.002	0.009	**0.054**	**0.049**
(12) leverage		−0.031	**−0.057**	**0.124**	**0.054**	**0.069**	**−0.122**	**0.100**	0.004	0.029
(13) tenure	*−0.036*		0.022	**−0.107**	**0.158**	**0.245**	**−0.106**	**−0.042**	**0.108**	**0.087**
(14) Seg	**−0.046**	0.019		−0.005	*−0.036*	**0.045**	0.031	−0.006	0.014	**0.045**
(15) Cimp	**0.103**	**−0.105**	0.025		**−0.742**	**0.103**	**0.315**	*0.036*	**0.705**	**0.350**
(16) Big4	**0.062**	**0.160**	−0.034	**−0.668**		0.000	**−0.366**	**−0.045**	**0.702**	**0.531**
(17) age	**0.076**	**0.263**	**0.052**	**0.089**	**−0.013**		**−0.079**	**−0.062**	**0.078**	0.004
(18) Qcah	**−0.097**	**−0.087**	−0.002	**0.306**	**−0.319**	**−0.115**		0.009	**0.368**	**0.247**
(19) issue	**0.093**	*−0.040*	0.004	0.028	**−0.045**	**−0.055**	−0.003		0.019	0.006
(20) Nclient	0.007	**0.112**	−0.026	**−0.679**	**0.699**	**−0.073**	**−0.334**	−0.020		**0.417**
(21) expert	*0.035*	**0.089**	*−0.038*	**−0.323**	**0.531**	−0.015	**−0.197**	−0.006	**0.429**	

Note: This table reports the Pearson (above the diagonal) and Spearman (below the diagonal) correlation coefficients among the variables in the study. Bold (italic) font indicates a statistical significance of at least 5% (10%). The list of variable definitions is in Appendix A.

TABLE 4 Effect of auditor workload on audit quality, all auditors

	Dep. Var.: *Absda* (discretionary accruals in absolute terms)		
	Full sample (1)	***Favor* = 1 (2)**	***Favor* = 0 (3)**
WL_{ALL}	0.006(1.40)	−0.005(−0.68)	0.014***(3.24)
Budgvar	0.005***(3.27)		
Chfee	0.004*(1.87)	−0.006(−0.41)	0.005***(3.44)
Firmsize	−0.007***(−3.73)	−0.008**(−2.17)	−0.008***(−4.93)
Salesgrth	0.006*(1.96)	0.016*(1.90)	0.006***(2.58)
Cfo	−0.104***(−3.13)	−0.101**(−2.55)	−0.098***(−5.46)
Ploss	0.007**(2.14)	0.003(0.45)	0.008**(2.14)
Leverage	0.029**(2.42)	0.042**(2.56)	0.027***(3.02)
Tenure	−0.000(−0.46)	0.003***(2.90)	−0.001*(−1.92)
Seg	−0.001(−0.73)	0.002(0.66)	−0.002(−1.15)
Cimp	−0.002(−0.08)	0.027(0.49)	−0.014(−0.51)
Big4	−0.005(−0.92)	−0.024**(−2.19)	0.003(0.44)
Age	−0.006**(−2.22)	−0.005(−0.81)	−0.010***(−3.60)
Qcah	0.437(1.30)	−0.129(−0.47)	0.637***(4.80)
Issue	0.010***(3.58)	0.009(1.43)	0.012***(3.75)
Nclient	0.005**(2.05)	0.009**(2.22)	0.003(1.55)
Expert	0.002(0.62)	0.005(0.42)	0.002(0.33)
Year dummy	0.002(0.93)	0.010*(1.66)	−0.000(−0.14)
Constant	0.160***(6.09)	0.175***(2.68)	0.173***(6.17)
Observations	2299	442	1857
R-squared	0.124	0.114	0.123

Note: The table reports the effect of auditors workload on audit quality by audit hour budget variance. The *Favor = 1* sample includes audit firms with favourable variance, the *Favor = 0* sample includes unfavourable variance firms and the *Full sample* includes both *Favor = 1 and 0* firms. Auditors workload is based on all auditors combined audit hours. All variables are defined in Appendix A.
*The statistical significance at least at 10% level in two-tailed tests.
**The statistical significance at least at 5% level in two-tailed tests.
***The statistical significance at least at 1% level in two-tailed tests.

(coeff. = 0.005, *t*-stat. = 2.19). However, audit hour budget variance for the partner groups does not affect the relation between workload pressure and audit quality. The coefficient for the workload in the favourable budget variance subsample (Column (2)) is 0.004 (*t*-stat. = 1.06), and it is 0.006 (*t*-stat. = 2.66) in the unfavourable budget variance subsample (Column (3)). The difference between the two coefficients for the favourable and unfavourable budget variance subsamples, respectively, is not statistically different (*p* value = 0.601), which indicates that the audit hour budget variance for the partner groups does not affect the relation between workload pressure and audit quality. This finding is in line with prior studies. For example, according to Liu and Simunic (2005), partner compensation is determined by the number of clients and their size (complexity). Generally, the client pool of bigger audit firms is concentrated among large and complex companies, whereas that of smaller audit firms is concentrated among small and simple companies (Liu, 2002). If clients' size and complexity are held constant, the number of clients is more important for partner compensation. Knechel et al. (2013) document that partner compensation is more sensitive to the number of new clients. Therefore, our results in Table 5 could be attributable to the partner's compensation structure. That is, if a partner's economic incentive is more closely tied to the number of clients than actual audit hours, it is not surprising that we find the relation between partners workload and audit quality is not sensitive to whether actual audit hours are within or exceed budget hours.

In sum, at the partner level, we find evidence that partners' workload pressure negatively affects audit quality. However, we do not find supporting evidence that the audit hour budget variance affects the relation between workload pressure and audit quality.

Table 6 provides the regression results for H2-2, where we focus on senior auditors. Overall, we do not find evidence that senior auditor workload pressure affects audit quality (coeff. = 0.002, *t*-stat. = 0.57). However, the coefficient for workload pressure (WL_{SN}) is 0.009 in the unfavourable budget variance subsample (Column (3)) and statistically significant (*t*-stat. = 2.33). On the other hand, the coefficient for workload pressure (WL_{SN}) is −0.009 in the favourable budget variance subsample (Column (2)), but statistically insignificant (*t*-stat. = −1.45). The difference between the two coefficients is statistically

TABLE 5 Effect of auditor workload on audit quality, partners

	Dep. Var.: *Absda* (discretionary accruals in absolute terms)		
	Full sample (1)	***Favor* = 1 (2)**	***Favor* = 0 (3)**
WL_{PT}	0.005**(2.19)	0.004(1.06)	0.006***(2.66)
Budgvar	0.005***(3.36)		
Chfee	0.004*(1.92)	−0.007(−0.44)	0.005***(3.55)
Firmsize	−0.007***(−4.04)	−0.009***(−2.61)	−0.007***(−4.54)
Salesgrth	0.006**(1.99)	0.017**(1.99)	0.006***(2.58)
Cfo	−0.104***(−3.13)	−0.101**(−2.57)	−0.099***(−5.47)
Ploss	0.008**(2.14)	0.003(0.38)	0.009**(2.39)
Leverage	0.030**(2.48)	0.041**(2.52)	0.029***(3.27)
Tenure	−0.000(−0.39)	0.003***(2.83)	−0.001*(−1.91)
Seg	−0.001(−0.78)	0.002(0.67)	−0.002(−1.27)
Cimp	−0.001(−0.02)	0.017(0.30)	−0.007(−0.25)
Big4	−0.004(−0.74)	−0.018*(−1.70)	0.001(0.24)
Age	−0.006**(−2.31)	−0.004(−0.66)	−0.011***(−3.87)
Qcah	0.403(1.21)	−0.070(−0.26)	0.570(4.34)
Issue	0.010***(3.43)	0.009(1.39)	0.011***(3.51)
Nclient	0.005**(2.14)	0.009**(2.20)	0.004*(1.73)
Expert	0.002(0.57)	0.004(0.36)	0.001(0.32)
Year dummy	0.002(0.79)	0.009(1.50)	−0.001(−0.23)
Constant	0.168***(6.35)	0.164**(2.53)	0.187***(6.69)
Observations	2299	442	1857
R-squared	0.125	0.116	0.121

Note: This table reports the effect of auditor workload on audit quality by audit hour budget variance. The *Favor = 1* sample includes audit firms with favourable variance, the *Favor = 0* sample includes unfavourable variance firms and the *Full sample* includes both *Favor = 1 and 0* firms. Auditor workload is based only on partners. All variables are defined in Appendix A.

*The statistical significance at least at 10% level.

**The statistical significance at least at 5% level.

***The statistical significance at least at 1% level.

significant at the 5% level (p value = 0.046), which supports our hypothesis; that is, an increase in senior auditor workload pressure has a negative effect on audit quality only when the budget variance is unfavourable.

In Tables 5 and 6, we examine how different types of auditors'—partners' or senior auditors'—workload pressures affect audit quality differently in two separate regressions by auditor level because of collinearity concerns between WL_{PT} and WL_{SN}.[13] However, since auditors work as a team, our approach in Tables 5 and 6 could suffer from omitted correlated variable bias. To address this concern, we include all three workload measures—WL_{PT}, WL_{SN} and WL_{ST}—in the same regression and reexamine the impact of workload pressure on audit quality.[14] We can thus isolate the effect of each auditor's workload pressure on audit quality from other auditors' workload pressure, and we report the results in Table 7.

When the audit hour budget variance is not considered as reported in Column (1) in Table 7, the coefficient for WL_{PT} is positive and significant (coefficient = 0.005, t-stat. = 1.96); however, neither the coefficient for WL_{SN} nor the coefficient for WL_{ST} is significant at conventional levels. The significant coefficient on WL_{PT} in Column (1) after controlling for the workload effect of other levels of auditors indicates that partners' workload pressure affects audit quality negatively (or has a positive relation with discretionary accruals).

The overall findings in the subsample analysis (Columns (2) and (3) of Table 7) are generally consistent with the regression results reported in Tables 5 and 6. For example, when the audit hour budget variance is unfavourable (Column (3)), the coefficients for WL_{PT} and WL_{SN} are positive and significant, which we interpret this finding to suggest that partners' and senior auditors' workload pressures affect audit quality negatively when auditors work more than the budgeted hours.

On the other hand, when the audit hour budget variance is favourable (Column (2) in Table 7), the coefficient for WL_{PT} is positive, while that for WL_{SN} is negative, both significant at least at the 10% level. This finding is consistent with the notion that, when auditors work less than the budgeted hours, partners' workload pressure affects audit quality negatively, but senior auditor workload pressure affects audit quality positively.

TABLE 6 Effect of auditor workload on audit quality, senior auditors

	Dep. Var.: *Absda* (discretionary accruals in absolute terms)		
	Full sample (1)	*Favor* = 1 (2)	*Favor* = 0 (3)
WL_{SN}	0.002(0.57)	−0.009(−1.45)	0.009**(2.33)
Budgvar	0.005***(3.42)		
Chfee	0.004*(1.88)	−0.007(−0.48)	0.005***(3.47)
Firmsize	−0.006***(−3.49)	−0.007**(−2.02)	−0.007***(−4.45)
Salesgrth	0.006*(1.94)	0.016*(1.92)	0.006**(2.53)
Cfo	−0.105***(−3.14)	−0.100**(−2.53)	−0.099***(−5.49)
Ploss	0.008**(2.23)	0.003(0.46)	0.008**(2.24)
Leverage	0.030**(2.49)	0.042**(2.55)	0.028***(3.17)
Tenure	−0.000(−0.49)	0.003***(2.96)	−0.001**(−2.00)
Seg	−0.001(−0.75)	0.002(0.69)	−0.002(−1.15)
Cimp	0.002(0.08)	0.033(0.59)	−0.010(−0.36)
Big4	−0.007(−1.33)	−0.024**(−2.31)	−0.001(−0.13)
Age	−0.006**(−2.27)	−0.005(−0.83)	−0.010***(−3.66)
Qcah	0.413(1.22)	−0.164(−0.61)	0.616***(4.63)
Issue	0.010***(3.57)	0.009(1.43)	0.012***(3.77)
Nclient	0.005**(2.08)	0.009**(2.26)	0.004(1.57)
Expert	0.003(0.67)	0.005(0.45)	0.002(0.42)
Year dummy	0.002(0.97)	0.010*(1.66)	−0.000(−0.08)
Constant	0.162***(6.14)	0.182***(2.79)	0.175***(6.27)
Observations	2299	442	1857
R-squared	0.123	0.118	0.121

Note: This table reports the effect of auditor workload on audit quality by audit hour budget variance. The *Favor* = *1* sample includes audit firms with favourable variance, the *Favor* = *0* sample includes unfavourable variance firms and the *Full sample* includes both *Favor* = *1* and *0* firms. Auditor workload is based only on senior auditors. All variables are defined in Appendix A.
*The statistical significance at least at 10% level.
**The statistical significance at least at 5% level.
***The statistical significance at least at 1% level.

Unlike more experienced auditors, the workload pressure of staff auditors who have fewer than 2 years of audit experience does not seem to affect audit quality at all; that is, none of the coefficients for WL_{ST} is significant.

5 | ROBUSTNESS TESTS

5.1 | Abnormal workload measure

Since auditor workload can be affected by many factors, we measure abnormal workload—which allows us to examine the validity of our main test results by controlling for the endogeneity issue associated with workload measures—as a residual from the following regression model that regresses workload pressures measures on factors known to affect workload:

$$WL_{i,t} = a_0 + a_1 * Firmsize_{i,t} + a_2 * Leverage_{i,t} + a_3 * Liquidity_{i,t} + a_4 * Ach_{i,t} + a_5 * Expt_{i,t} + a_6 * Forown_{i,t} + a_7 * Big4_{i,t} + a_8 * List_{i,t} + e_{i,t} \quad (3)$$

where $Liquidity_{i,t}$ is measured by the ratio of current assets to current liabilities, $Ach_{i,t}$ is an indicator variable that takes the value of one if the auditor changes from the prior year, $Expt_{i,t}$ is measured by the proportion of export to total sales, $Forown_{i,t}$ is the percentage of stocks owned by foreign investors and $List_{i,t}$ is an indicator variable set to one if the client firm is listed on KOSPI, and zero otherwise. All the other variables are measured as before. The error term, $e_{i,t}$, is the abnormal workload ($AbWL_{i,t}$).

Most factors included in our auditor workload determinant model seem to affect auditor workload, as expected. For example, the auditor workload for Big 4 auditors and listed firms is less than that of their counterparts. Larger firms, more levered firms, and firms with a high level of foreign ownership have greater workloads, which is consistent with our expectation (regression outputs not tabulated).

After replacing the raw workload variables (*WL*) with the abnormal workload variables (*abWL*), we replicate tables similar to Tables 4–7 and report the corresponding results in Panels A to D of Table 8, respectively. Here, we report only the coefficients for our main variables of interest and omit the coefficients for the control variables. The signs and magnitudes for the coefficients of our main

TABLE 7 Effect of auditor workload on audit quality by auditor type

	Dep. Var.: *Absda* (discretionary accruals in absolute terms)		
	Full sample (1)	***Favor* = 1 (2)**	***Favor* = 0 (3)**
WL_{PT}	0.005**(1.96)	0.007*(1.79)	0.005**(2.07)
WL_{SN}	−0.000(−0.03)	−0.013*(−1.96)	0.007*(1.73)
WL_{ST}	−0.001(−1.37)	0.001(0.49)	−0.001(−1.14)
Budgvar	0.005***(3.43)		
Chfee	0.004*(1.90)	−0.009(−0.61)	0.005***(3.43)
Firmsize	−0.007***(−3.50)	−0.008**(−2.21)	−0.008***(−4.49)
Salesgrth	0.006**(2.03)	0.017**(2.03)	0.006***(2.66)
Cfo	−0.104***(−3.12)	−0.099**(−2.51)	−0.098***(−5.44)
Ploss	0.008**(2.26)	0.002(0.34)	0.008**(2.27)
Leverage	0.030**(2.46)	0.041**(2.54)	0.027***(3.09)
Tenure	−0.000(−0.43)	0.003***(2.98)	−0.001*(−1.89)
Seg	−0.001(−0.76)	0.002(0.74)	−0.002(−1.16)
Cimp	0.000(0.01)	0.029(0.53)	−0.013(−0.46)
Big4	−0.001(−0.16)	−0.022*(−1.91)	0.005(0.85)
Age	−0.007**(−2.34)	−0.004(−0.75)	−0.011***(−3.80)
Qcah	0.406(1.20)	−0.175(−0.65)	0.610***(4.59)
Issue	0.010***(3.48)	0.008(1.28)	0.012***(3.63)
Nclient	0.005**(2.15)	0.010**(2.31)	0.004*(1.68)
Expert	0.002(0.57)	0.005(0.41)	0.001(0.32)
Year dummy	0.002(0.79)	0.009(1.45)	−0.001(−0.22)
Constant	0.163***(6.02)	0.184***(2.81)	0.177***(6.25)
Observations	2299	442	1857
R-squared	0.126	0.125	0.123

Note: This table reports the effect of auditor workload on audit quality by auditor type, that is, partners, senior auditors and staff auditors. The *Favor = 1* sample includes audit firms with favourable variance, the *Favor = 0* sample includes unfavourable variance firms and the *Full sample* includes both *Favor = 1 and 0* firms. All variables are defined in Appendix A.

*The statistical significance at least at 10% level in two-tailed tests.

**The statistical significance at least at 5% level in two-tailed tests.

***The statistical significance at least at 1% level in two-tailed tests.

variable of interest as well as the control variables (not tabulated) are similar to those reported in Tables 4–7, which are based on the original raw workload pressure measures.

For example, Panel A of Table 8 replicates Table 4 with abnormal workload measures. The coefficient for the abnormal workload ($abWL_{ALL}$) in the favourable budget hour variance subsample is −0.005 (t-stat. = − 0.68, Column (2)), but the coefficient is 0.014 (*t*-stat. = 3.24) in the unfavourable budget hour variance subsample (Column (3)) in Panel A of Table 8. When we use abnormal workload measures for partners only (Panel B) or senior auditors only (Panel C), the results are similar to our main results reported in Tables 5 and 6.

Panel D of Table 8 reports the effects of auditor level on audit quality after controlling for the effect of other levels of auditors. Overall, partners' abnormal workload negatively affects audit quality (Column (1)), and audit hour budget variance does not seem to affect the relation between partners' workload and audit quality. However, when the actual number of audit hours is less than the budgeted audit hours (i.e., *Favor* = 1), senior auditors' abnormal workload hours have a positive impact on audit quality. On the other hand, they have a negative impact on audit quality when the audit hour budget variance is unfavourable, but the effect is slightly weaker when abnormal workloads are used (*t*-stat. = 1.57).

Overall, when we use an alternative measure of auditor workload pressure, the empirical findings still support all our hypotheses.

5.2 | An alternative measure of audit quality

As an alternative measure of audit quality, we use a firm's level of discretionary accruals, following a method proposed by Dechow and Dichev (2002). We replicate our main tables based on this alternative measure of audit quality and find similar results as reported in Table 9. For example, we find that the coefficient for WL_{ALL} is significantly

TABLE 8 Effect of auditor workload on audit quality, abnormal workload

Panel A: All auditors			
	Dep. Var.: *Absda* (discretionary accruals in absolute terms)		
	Full Sample (1)	***Favor* = 1 (2)**	***Favor* = 0 (3)**
$abWL_{ALL}$	0.006(1.40)	−0.005(−0.68)	0.014***(3.24)
Budgvar	0.005***(3.27)		
Control variables not reported			
Observations	2299	442	1857
R-squared	0.124	0.114	0.123
Panel B: Partners			
	Dep. Var.: *Absda* (discretionary accruals in absolute terms)		
	Full Sample (1)	***Favor* = 1 (2)**	***Favor* = 0 (3)**
$abWL_{PT}$	0.005**(2.05)	0.004(1.15)	0.006**(2.36)
Budgvar	0.005***(3.38)		
Control variables not reported			
Observations	2299	442	1857
R-squared	0.124	0.115	0.121
Panel C: Senior auditors			
	Dep. Var.: *Absda* (discretionary accruals in absolute terms)		
	Full Sample (1)	***Favor* = 1 (2)**	***Favor* = 0 (3)**
$abWL_{SN}$	0.002(0.45)	−0.008(−1.35)	0.008**(2.10)
Budgvar	0.005***(3.44)		
Control variables not reported			
Observations	2299	442	1857
R-squared	0.123	0.117	0.120
Panel D: By auditor type			
	Dep. Var.: *Absda* (discretionary accruals in absolute terms)		
	Full Sample (1)	***Favor* = 1 (2)**	***Favor* = 0 (3)**
$abWL_{PT}$	0.004*(1.83)	0.008*(1.85)	0.005*(1.82)
$abWL_{SN}$	−0.000(−0.11)	−0.012*(−1.89)	0.006(1.57)
$abWL_{ST}$	−0.001(−1.38)	0.001(0.52)	−0.001(−1.16)
Budgvar	0.005***(3.47)		
Control variables not reported			
Observations	2299	442	1857
R-squared	0.1252	0.1245	0.1225

Note: This table reports the effect of auditors abnormal workload on audit quality by audit hour budget variance. The *Favor = 1* sample includes audit firms with favourable variance, the *Favor = 0* sample includes unfavourable variance firms and the *Full sample* includes both *Favor = 1 and 0* firms. Panel A reports the effect of the entire audit teams abnormal workload on audit quality. Panel B reports the effect of partners abnormal workload on audit quality. Panel C reports the effect of senior auditors abnormal workload on audit quality. Panel D reports the effect of auditors abnormal workload on audit quality for each auditor type, after controlling for other types of auditors effects. All variables are defined in Appendix A.

*The statistical significance at least at 10% level in two-tailed tests.

**The statistical significance at least at 5% level in two-tailed tests.

***The statistical significance at least at 1% level in two-tailed tests.

TABLE 9 Effect of auditor workload on audit quality, alternative *Absda*

	Dep. Var.: *Absda* (discretionary accruals in absolute terms)		
	Full sample (1)	***Favor* = 1 (2)**	***Favor* = 0 (3)**
WL_{all}	0.006***(3.33)	0.004(1.28)	0.007***(3.93)
Budgvar	0.000(0.75)		
Chfee	0.000(0.46)	−0.005(−0.76)	0.000(0.50)
Firmsize	−0.006***(−6.09)	−0.007***(−4.37)	−0.006***(−7.63)
Salesgrth	0.002(0.86)	0.005(1.42)	0.001(1.47)
Cfo	−0.036**(−3.08)	−0.022(−1.26)	−0.039***(−4.69)
Ploss	0.008***(4.81)	0.011***(3.91)	0.007***(4.67)
Leverage	0.013***(2.92)	0.027***(3.79)	0.010***(2.69)
Tenure	−0.001***(−3.67)	−0.001*(−1.67)	−0.001***(−4.25)
Seg	−0.000(−0.52)	0.000(0.16)	−0.000(−0.65)
Cimp	0.026*(1.95)	0.020(0.81)	0.023*(1.95)
Big4	0.002(0.86)	−0.002(−0.52)	0.003(1.19)
Age	−0.006***(−4.12)	−0.009***(−3.33)	−0.006***(−4.21)
Qcah	0.108(1.41)	0.125(1.07)	0.106(1.63)
Issue	0.002(1.53)	−0.003(−1.02)	0.003**(2.05)
Nclient	0.002**(2.07)	0.001(0.63)	0.003**(2.56)
Expert	0.001(0.29)	0.005(0.99)	−0.000(−0.06)
Year dummy	−0.002***(−2.87)	−0.006**(−2.14)	−0.001(−1.05)
Constant	0.114***(8.82)	0.154***(5.46)	0.111***(9.03)
Observations	2208	427	1781
R-squared	0.170	0.236	0.164

Note: This table reports the effect of auditor workload on audit quality by audit hour budget variance. The *Favor = 1* sample includes audit firms with favourable variance, the *Favor = 0* sample includes unfavourable variance firms and the *Full sample* includes both *Favor = 1 and 0* firms. Abnormal discretionary accruals are measured by the method suggested by Dechow and Dichev (2002) to proxy for audit quality. Auditor workload is based on all auditors combined audit hours. All variables are defined in Appendix A.

*The statistical significance at least at 10% level in two-tailed tests.

**The statistical significance at least at 5% level in two-tailed tests.

***The statistical significance at least at 1% level in two-tailed tests.

positive (coefficient = 0.007, *t*-stat. = 3.93) only when the audit hour budget variance is unfavourable (*Favor* = 0), which is similar to our findings in Table 4. All the other coefficients for the control variables are also consistent with the results in Table 4.

6 | CONCLUSIONS

The lack of data availability has been one of the biggest challenges researchers face in examining the relation between audit quality and auditor workload under audit hour budget pressure. Utilizing unique data set with both actual and budgeted audit hours for the Korean audit market, this study examines how auditor workload under audit hour budget pressure affects audit quality. We first document a negative relation between auditor workload and audit quality only when total reported audit hours exceed budgeted audit hours. This finding is consistent with the notion that the stress and burnout caused by increased audit hours under budget pressure leads auditors to engage in quality-threatening behaviour and to affect audit quality negatively. We also document that partners' workload has a negative impact on audit quality, but senior auditor workload negatively affects audit quality only when the budget variance is unfavourable. This implies that non-partner auditors are more likely to be affected by the increase in workload under budget pressure conditions.

One caveat of this study concerns our use of accrual quality as the measure of audit quality, an inherently noisy proxy. We considered using alternative proxies, such as the number of financial restatements or going concern opinions for audit quality, as used in other studies; however, in the Korean market, financial restatements and going concern opinions are very rare. For example, during our sample period, only four firms received qualified opinions and two firms received going concern opinions. In addition, in any given year, there are fewer than 10 restatement announcements among 1500 listed companies in Korea (FSS, 2020). Therefore, we cannot rule out the possibility that our results are sensitive to other measures of audit quality.

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CONFLICT OF INTEREST

The authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in this manuscript.

ETHICS STATEMENT

Ethics approval is not required for this study.

AUTHOR CONTRIBUTIONS

Seokyoun Hwang mainly contributed to the conceptualization, data collection, and research design. Philip Keejae Hong mainly performed the empirical analyses, writing of introduction and conclusions. All authors read and approved the final manuscript.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the KICPA. Restrictions apply to the availability of these data, which were used under license for this study. Data are available with the permission of the KICPA.

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ENDNOTES

[1] Other studies that have used the survey approach are those of Cook and Kelley (1991), Coram et al. (2003), McNamara and Liyanarachchi (2008), Otley and Pierce (1996), and Willett and Page (1996).

[2] The International Standard of Quality Control is available at https://www.ifac.org/system/files/downloads/a007–2010-iaasb-handbook-isqc-1.pdf.

[3] Since a new guideline for audit hours, titled "Standard Audit Hours," was adopted in Korea in 2019, regulators still need to provide more detailed guidelines on partners' and staff auditors' workloads. See KICPA's announcement (14 February 2019) at https://www.kicpa.or.kr/portal/default/kicpa/gnb/kr_pc/menu05/menu11.page?action=READ&boardId=stable&bltnNo=11550111469894.

[4] The FSC is a decision-making government organization, and the FSS is its enforcement agency.

[5] Until 1999, audit fee ranges were regulated by the KICPA standards regarding client firm size, the listed market, and changes of auditors.

[6] According to the FSS, the average proportion of audit fees to revenue of Big four firms has continuously decreased from 45% in 2004 to 32% in 2018.

[7] Subscript *i* denotes the firm and *t* denotes the year.

[8] As a robustness check, we also include *issuance of debt* and *issuance of equity* as two separate variables instead of *Issue* in our regression Equation 1 and report very similar results (not tabulated).

[9] A few control variables (e.g., *Tenure*, *Big4* and *Qcah*) have different effects on our dependent variable (*Absda*) in the two subsamples (i.e., firms with favourable versus unfavourable budget variance), which requires a fully interacted regression of all independent variables with *Favor* or two separate regressions for each subgroup. Since we already have more than 15 independent variables, we report two separate regression results for ease of exposition.

[10] TS2000 is a database compiled by Korean Companies Information, Inc., that includes financial data for companies listed on the Korean stock markets KOSPI, KOSDAQ and the Korea New Exchange.

[11] The Pearson correlation coefficients are reported in the upper triangle while Spearman correlation coefficients in the lower triangle.

[12] As audit quality is measured by the discretionary accruals in absolute terms, positive (negative) coefficients indicate low (high) audit quality.

[13] The Spearman correlation coefficient between WL_{PT} and WL_{SN} is 0.473.

[14] We give special thanks to an anonymous reviewer for bringing this point to our attention.

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APPENDIX A: VARIABLE DEFINITIONS

Variable	Definition
Absda	The absolute value of abnormal accruals based on Jones (1991) model of abnormal accruals adjusted for the prior years' performance (Kothari et al., 2005)
WL_{ALL}	The natural logarithm of the total workload measured by the total number of actual audit hours divided by the number of all auditors
WL_{PT}	The natural logarithm of the total workload measured by the total number of actual audit hours worked by partners divided by the number of partners
WL_{SN}	The natural logarithm of the total workload measured by the total number of actual audit hours worked by senior auditors divided by the number of senior auditors
WL_{ST}	The natural logarithm of the total workload measured by the total number of actual audit hours worked by staff auditors divided by the number of staff auditors
$AbWL_{ALL}$	The abnormal workload for all auditors measured by the residual term from Equation (3)
$AbWL_{PT}$	The abnormal workload for partners measured by the residual term from Equation (3)
$AbWL_{SN}$	The abnormal workload for senior auditors measured by the residual term from Equation (3)
$AbWL_{ST}$	The abnormal workload for staff auditors measured by the residual term from Equation (3)
Favor	An indicator variable that takes the value of one when budgeted audit hours are more than actual audit hours, and zero otherwise
Budgvar	Reported audit hours minus budgeted audit hours, scaled by budgeted audit hours
Chfee	Annual changes in audit fees
Firmsize	The natural logarithm of a firms total assets
Salesgrth	The sales growth rate over the prior year as a percentage
Cfo	The operating cash flow divided by total assets
Ploss	An indicator variable that takes the value of one when a firm reports a negative net income during any of two prior years ($t-1$ or $t-2$), and zero otherwise
Leverage	Total liabilities divided by total assets
Tenure	The duration of the auditor–client relationship, in years
Seg	The number of segments
Cimp	The clients importance for each audit firm, measured as the natural logarithm of the clients audit fee divided by the sum of all the audit firms clients audit fees
Big4	An indicator variable set to one when the auditor is a big 4 auditor, and zero otherwise
Age	The number of years since the client firm was incorporated
Qcah	Quality control hours divided by total audit hours per engagement
Issue	An indicator variable that takes the value of one if the change in financial cash flow is positive in the current year, and zero otherwise
Nclient	The natural logarithm of the number of audit clients audited by the same auditor during each calendar year
Expert	The auditors industry specialization indicator variable, which takes the value of one if the auditor audits more than 30% of audit clients in each two-digit SIC code industry each year, and zero otherwise