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Remote Work and Audit Quality: A Natural Experiment Approach

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Abstract

This study exploits the shutdown of non-essential businesses as a unique setting to address the effect of mandatory remote work on audit quality. The basic empirical design is a pre/post analysis where the variable of interest is an indicator variable for remote work. Three measures of audit quality are used namely, discretionary accruals, going concern, and meeting or beating analysts' forecasts. To mitigate potential endogeneity concerns, a difference-in-differences research design in employed. The combined evidence in this study suggests that audit quality improves with remote work. Firms audited remotely have lower discretionary accruals, are less likely to meet or beat analyst forecasts, and are more likely to get a going concern opinion. A limitation of the archival research design is the inability to identify specific aspects of the audit process that change with remote work. Nevertheless, these findings have significant implications for the audit practice, indicating that in order to support talent retention, audit firm executives should continue making investments in technology that promotes greater work flexibility. This paper serves as an archival study to examine the relationship between remote work and audit quality and impacts our understanding of the audit process literature. Altogether, the findings yield timely insights to address the ongoing tension between employees and employers regarding a flexible geographical working arrangement and work-life balance.

Key words: *audit quality; financial reporting quality; going concern; remote audit; remote work;*

JEL Classification*: M42*

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1. Introduction

The demand for workplace flexibility has increased over the years with longer commute times and changing family dynamics (Ingraham, 2019). Still, many companies remain stagnant and apprehensive about allowing employees to work from home. Audit practitioners suggest working from home is positively associated with audit quality (KPMG, 2020). However firm management perceives the negative impacts to outweigh the benefits, given the return to in-person work following the pandemic (Gibson, 2023). Thus, the association between working from home and audit quality remains an empirical question. In this work, we address this question using the shutdown of non-essential businesses during the COVID-19 pandemic as a natural experiment.

We analyze a sample of U.S. public companies during the period 2018-2020 using three proxies for audit quality: absolute discretionary accruals, the probability of receiving a going concern opinion, and the likelihood of meeting or beating analyst forecasts. For each of the three measures, we conduct a pre/post analysis where the variable of interest is an indicator variable for remote work, set to a certain value for all firms in 2020 that filed after March 13th, when the U.S. president issued a proclamation declaring a national state of emergency and ordered all businesses to shut down[1]. Additionally, we use a difference-in-differences approach, splitting the sample into pre-2019 fiscal year-end audit, which occurs before 2020, and post-2019 fiscal year-end audit, which occurs during 2020.

Our findings indicate that audit quality improves with remote work. Remote audits are associated with lower discretionary accruals, firms are also less likely to meet or beat analyst forecasts and are more likely to get a going concern opinion. The findings are robust to alternative research designs including auditor change and limiting the analyses to only accelerated filers.

Overall, these findings contribute to the literature in three ways. First, this is a study to explore whether working remotely has an impact on audit quality in the archival literature. Until the COVID-19 pandemic, there had not been a consistent period of time where all auditors in the nation completed work from home. Prior literature on remote auditing has primarily been theoretical, survey, and behavioral research. Teeter et al. (2010) developed a theoretical framework for remote work, but do not draw inferences about its relationship to audit quality. In response to the COVID-19 pandemic, survey studies and desk studies emerged discussing the implications of the pandemic, as a whole, on audit work (Akrimi 2021; Albitar et al. 2021). In behavioral research, audit group judgment and decision-making have been studied extensively in different contexts, including virtual teamwork (Bauer et al., 2022). While experiments have various advantages, they are narrower in scope than other methodologies which can provide further insights into the topic of interest. Thus, it is necessary to consider the evidence provided by this archival study as complementary to the findings provided by the existing literature to draw meaningful inferences.

Second, examining the association between remote work and audit quality sharpens our current understanding of the audit process literature. The existing body of research on audit quality indicators has been reviewed and classified into a balanced scorecard with four categories: inputs, process, outcomes, and context (Knechel et al., 2013). We purport that a shift from on-site audit work (at the client site or the office) to remote audit work (at home or elsewhere) has a pervasive effect on the nature of the audit. Specifically, the implications drawn from this study impact our understanding of the audit process literature since a remote setting alters several components of the audit process, including the nature and extent of testing required, auditor judgment and decision-making involved in the review process, and auditor-client interactions.

Third, this study contributes broadly, not only to the academic literature but also to the dialog between employee and employer over remote work in the accounting profession and across industries. In the audit profession, remote work has important implications that affect the future of the audit practice, including lower audit fees due to reduced travel expenses and the retention of talented professionals because of the increased work flexibility. Countless surveys have reported the benefits of remote work, including improvements to employee satisfaction, work-life balance, and environmental sustainability, but have failed to persuade many employers to significantly update work arrangements. This

[1] Given this nationwide proclamation, both clients and auditors during the sample period worked remotely beginning March 13, 2020. While this does not provide for cross-sectional analyses based on state restrictions, it also increases our confidence that the findings in the analysis are not attributable to diversity in state policies.

paper aims to support the settlement of this dispute by contributing archival evidence to the discussion.

The remainder of the paper is organized as follows. Section 2 discusses the setting and reviews prior work on audit quality. Section 3 states the hypothesis. Section 4 discusses the research methodology. Section 5 presents the empirical results. Section 6 presents the results of robustness checks. Finally, Section 7 concludes and provides suggestions for future research.

2. Background and Theoretical Development

2.1 Remote Work Literature

The research on remote teamwork mainly adopts a behavioral perspective and documents both positive and negative outcomes of remote work. Studies document several benefits including the reduction in in-person meeting time, fewer disruptions, greater originality, and less discrimination in teams (Bergiel, Bergiel, and Balsmeier 2008). Additionally, teams working remotely experience increased productivity, enhanced teamwork performance, and increased voluntary work effort (Felstead and Henseke 2017; Ferreira et al. 2021; Li et al. 2023; Raghuram et al., 2001). Despite the benefits, working from home can make it difficult to create boundaries between work and home, resulting in exhaustion, burnout, and family conflicts, which negatively impact individual performance (Butts, Becker, and Boswell 2015; Raghuram et al. 2019). Researchers have also found that firms with high inventory and research and development relative to assets with non-Big 4 auditors experienced declines in audit quality after the COVID-19 travel restrictions were issued in 2020 (Gong et al., 2022) and that the COVID-19 pandemic negatively impacted audit quality on Chinese firms, especially when the audit was performed by less experienced auditors (Lin et al., 2024). Additional work has shown that internal auditors may perceive no difference in audit efficiency and effectiveness between remote and in-person audits and that support from the auditee is essential for successful remote audits (Eulerich et al., 2022).

A stream of research on remote work also discusses the role of technology to foster collaboration between individuals. Prior research finds that a lack of awareness of other colleagues can lead to a lack of motivation (Olson and Olson, 2006). Studies suggest that tools facilitating constant communication between employees increase awareness and subsequently effort. For example, a study that used a visualization tool to record the keystrokes employees contributed to a collaboration found that it resulted in improvements in both effort and performance. However, this increase was only observed when the team was comprised of a few highly conscientious members, not in teams that were comprised mostly of highly conscientious members (Glikson et al., 2019). Further, text-based technology allows individuals to take time to formulate a question and subsequent response, which can be more efficient than verbal communication (Hinds and Kiesler, 2002).

Still, it is important to study remote work on U.S. firms and specifically in the context of external audits since the suitability of remote work varies between industries and economies. A study of 2,000 tasks, 800 jobs, across 9 different countries concludes that remote work is best suited for certain types of industries, professions, and geographies. Particularly in advanced economies like the United States, industries like financial services, business services, information technology, and management were found to have the most potential since employees spend the most time on tasks that can be completed effectively remotely (Lund et al., 2021). Based on the nature of tasks performed, it seems that auditing falls among the professions that are particularly well suited for remote work[1]. In the next section we identify two key aspects of the audit process that are impacted by remote work as they are relevant to the timing of our study: the audit review process and auditor-client interactions.

2.2 Remote Work and the Audit Process

2.2.1 Audit Review Process

In the audit review process, remote work can lead to both positive and negative outcomes. Opponents of auditing remotely may raise concerns related to the obstacles introduced by this work arrangement. The audit completion and review processes involve information and communication flow up and down the preparer and reviewer hierarchy, from preparer to manager to partner

[1] Jobs that require analyzing data and information, managing people, and cognitive thinking have the greatest potential to be completed from home. Examples of jobs that are least effective remotely are those that require assisting and caring for others, selling to others, and controlling machines and mechanical equipment (Lund et al. 2021).

and back. At any given time, it is not uncommon for one member of the audit team to be aware of information that all members are not yet privy to (Murthy and Kerr, 2004). Thus, in a remote setting, the level of review and revision could falter due to the increased information asymmetry arising from the change in communication patterns.

On the other hand, behavioral studies conducted at the individual auditor level reveal that manager reviews of audit workpapers vary widely based on perceived preparer quality, preparer familiarity, and expectations about the client (Asare and McDaniel, 1996; Gibbins and Trotman, 2002). This demonstrates that there is a bias in familiarity, that perhaps could be alleviated by the reduction in proximity introduced by remote work[1]. Similarly, the psychology literature on small group decision making identifies the "groupthink" phenomena, which is the deterioration in decision-making effectiveness for groups who work closely on a continuing basis (Bénabou, 2013). Based on these theories, both preparers and reviewers ought to become more objective while working in separate environments when compared to working face-to-face, which is a potential benefit of remote work.

2.2.2 Auditor-Client Interactions

Apart from collaborating within the team, auditors also have the ability to work with the audit committee and other parties in the corporate governance structure to ensure quality financial reporting (Beasley et al., 2009; Cohen, Krishnamoorthy, and Wright, 2002; DeZoort and Salterio, 2001). Near the final stages of the audit, audit managers must communicate important matters with management and the audit committee. In some cases, this involves delicate matters that may be more difficult to convey remotely, such as the discovery of a material weakness or issuing a going concern opinion. Since managers are also responsible for maintaining a positive client relationship, this could present a conflict of interest which impairs auditor judgment and consequently audit quality.

Alternatively, on the client side, auditors performing work further away from their client offices may allow auditors to exercise greater objectivity and skepticism, which serves as an unforeseen benefit of remote work. Moreover, prior studies find that during electronic communications higher-ranked individuals are less dominant over lower-ranked individuals, resulting in greater equality of interaction compared to face-to-face communications (Driskell, Radtke, and Salas, 2003). While working remotely, lower-ranked audit team members such as interns and staff may find client interactions less intimidating and more productive.

[1] Audit team staffing varies widely between set teams and reassigned teams since turnover is high in the audit practice. Familiarly between team members is always an issue and it is particularly important in a remote context.

3. Hypothesis

Based on the theory discussed above, remote work in complex areas, such as the audit review process and the auditor-client interactions, can be associated with both positive and negative outcomes. As such, we state our hypothesis in null form as follows:

H_o: Audits performed in a remote setting do not differ in audit quality from audits performed in a traditional in-person setting.

4. Research Design

4.1 Methodology

This study uses U.S. public company data for companies with a December 31 fiscal year-end from 2017 through 2019, for which audits were filed from 2018 through 2020[2]. We obtain firm fundamentals from Compustat, auditor data from Audit Analytics, and analyst data from I/B/E/S. We employ three proxies for audit quality: absolute discretionary accruals, the probability of getting a going concern opinion, and the likelihood of meeting or beating analyst forecasts. The basic empirical design is a pre/post analysis where the variable of interest is an indicator variable for remote work, set to a certain value for all audits filed after March 13th, 2020, when the U.S. president issued a proclamation declaring a national state of emergency and ordered all businesses to shut down. This excludes all reporting companies with a public float of $700 million or more (i.e., “large accelerated filers”) since they filed by March 1st, 2020, before the national state of emergency was declared[3].

[2] SEC Filing Deadlines are as follows: large accelerated filers (60 days from year-end), accelerated filers (75 days from year-end), non-accelerated filers (90 days from year-end).

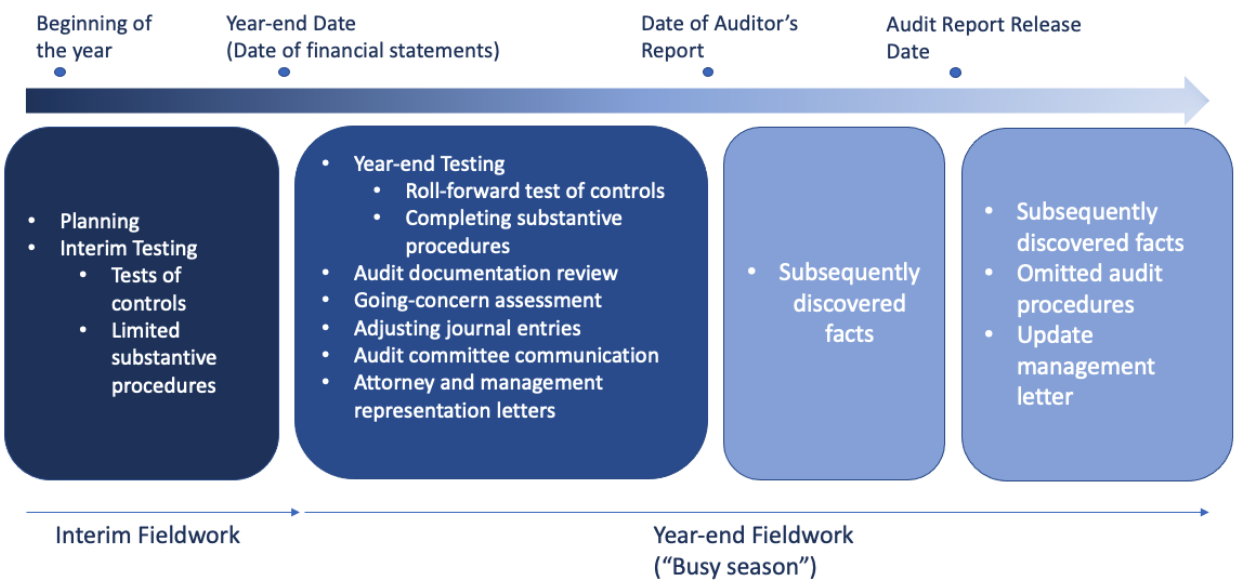
[3] In 2020, the U.S. Securities and Exchange Commission (SEC) updated accelerated filer definitions. The amendments were effective April 27, 2020, which does not impact the sample period.

Additionally, we use a difference-in-differences approach as a quasi-experimental method to mitigate the effects of the pandemic and other extraneous factors. We validate the parallel trends assumption and find that there is no systemic trend between the treatment and audit quality in the pre-period. We split the sample into the pre-period, including 2017 and 2018 fiscal year-end audits which were filed in 2018 and 2019, and the post-period, including 2019 fiscal year-end audits which were filed in 2020. Finally, the treatment group is firms with an audit filing date after March 13th, 2020, while the control group is firms with an audit filing date before March 13th. The requirement to audit remotely was imposed externally and not assigned based on auditor and client characteristics. Moreover, since the pandemic outbreak occurred in 2020, the financial impacts of the pandemic would not have significantly impacted the client's operating activities for the 2019 financial statement audit.

4.2 Audit Timeline

Given the timing of the national state of emergency on March 13th, 2020, it is important to establish the audit timeline to distinguish areas of the audit process that fall in the pre- and post-period and to clarify the identification of the treatment and control groups in the difference-in-differences analyses. **Figure no. 1** outlines the standard financial statement audit timeline. As shown in the figure, most of the audit procedures are performed after the fiscal year end date (12/31), up to the date of the audit report. This period is referred to as "busy season" in the audit practice. As such, the areas of the audit process discussed in Section 2.2 including evidence collection, workpaper reviews, and auditor-client interactions are all conducted during busy season. Furthermore, note that the audit of 12/31/19 year-end financial statements take place subsequently in 2020. As such, the proxies used for audit quality are based on the 2019 financial statements, and therefore they are not impacted by pandemic effects.

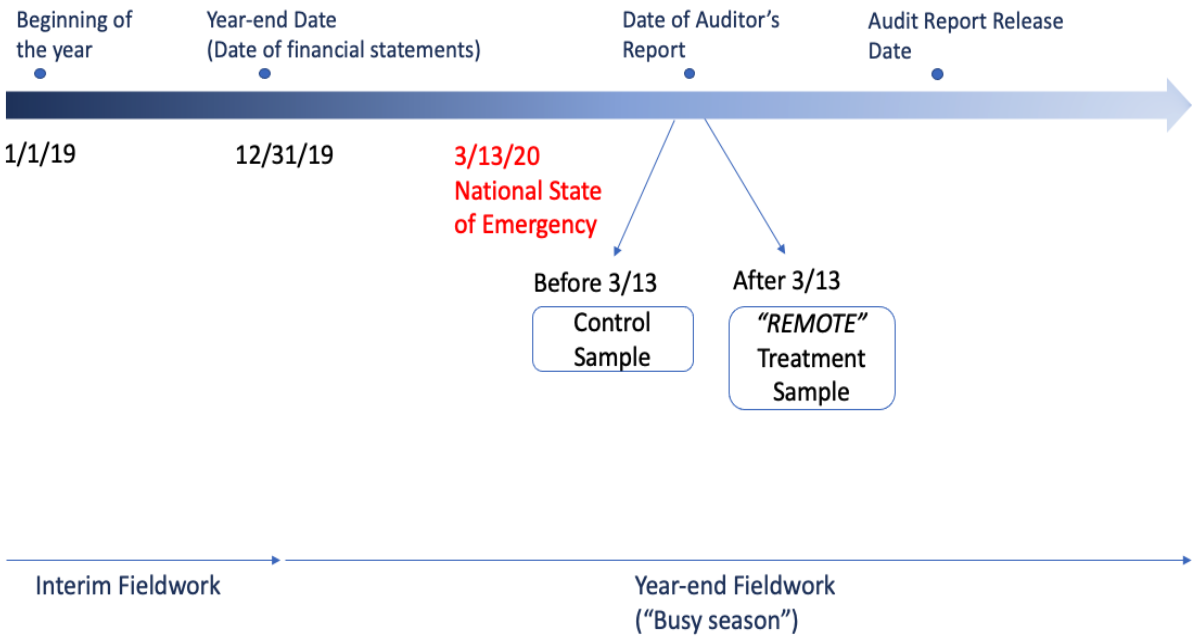
Figure no. 1. Audit timeline



Source: own projection

Figure no. 2 displays the identification of the treatment and control samples in the difference-in-differences analyses. Since the national state of emergency was declared on 3/13/20, we use this event date to identify a treatment sample of audits that were subject to remote work, and a control sample of audits that were filed before the national state of emergency required auditors to work remotely. The 12/31/19 fiscal year-end audits that were filed before 3/13/2020 are identified as the control sample and the audits filed after 3/13/2020 are identified as the treatment sample.

Figure no. 2. Diff-in-Diff: Treatment and Control Sample



Source: own projection

Finally, **Figure no. 3** presents the assignment of the pre- and post-periods in the difference-in-differences analyses. As shown in the figure, the pre-period is the 2018 financial statement audit taking place in 2019 and the post-period is the 2019 financial statement audit taking place in 2020. The control and treatment groups are assigned based on the audit filing date before or after 3/13 in the subsequent year respectively. Note only 2018 is shown as the pre period for illustrative purposes. In the main analyses, we include both 2017 and 2018 in the pre period and re-run the analyses using alternative designs for the pre period as robustness checks in Section 6.

Figure no. 3. Diff-in-Diff: Pre- and Post-Period

Source: own projection

4.3 Discretionary Accruals Measure

The first audit quality proxy is performance-adjusted absolute discretionary accruals (*ADA*), based on the Jones (1991) model and including return on assets (*ROA*) as in Kothari et al. (2005). Using model (1), we regress total accruals (*AC*) on change in revenue (ΔR), property, plant, and equipment (*PPE*), and return on assets (*ROA*) to obtain the residuals used as the Jones model discretionary accruals in models (2) and (3).[1] All variables are deflated by assets to mitigate heteroskedasticity in residuals following prior studies.

$$AC_{i,t} = \beta_0 + \beta_1 \Delta R_{i,t} + \beta_2 PPE_{i,t} + \beta_3 ROA_{i,t} + \varepsilon_{i,t} \quad (1)$$

We employ a pre/post and difference-in-differences analyses to estimate the relationship between absolute discretionary accruals and remote work in models (2) and (3), respectively.

$$ADAi,t = \beta0 + \beta1\ REMOTEi,t + \Sigma\beta jCONTROLS\ i,t + +YEAR\_FE + INDUSTRY\_\ FE\ vi, \quad (2)$$

$$ADAi,t = \beta0 + \beta1\ POSTi,t + \beta2REMOTE\ i,t,+ +\beta3\ POST*REMOTEi,t + \Sigma\beta jCONTROLS\ i,t + +INDUSTRY\_\ FE\ vi,t \quad (3)$$

The dependent variable is absolute discretionary accruals (*ADA*) which are estimated using an annual cross-sectional model for each industry. *REMOTE* is an indicator variable that takes the value of "1" for remote audit and is the main variable of interest in equation (2). *POST*REMOTE* is an interaction term and the primary variable of interest in the difference-in-differences model in equation (3). Following Minutti-Meza (2013), controls are included for both auditor and client characteristics which may impact discretionary accruals, including Big-4 auditor (*BIG4*), auditor tenure (*TENURE*), firm size (*LOGMKT*), book-to-market ratio (*BTM*), absolute accruals (*ABSACCRL*), growth in sales (*GROWTH*), financial risk (*LEV, ALTMAN, STDEARN*), and financial performance (*ROA, ROAL, LOSS, CFO*). YEAR_FE are year fixed effects. All variable definitions and data sources are included in the *Appendix*. The expected signs for each variable based on prior literature are included in **Table no. 3**.

[1] As in Kothari et al. (2005), we also use a modified sales change variable ($\Delta R_{i,t} - \Delta AR_{i,t}$), using change in sales net of accounts receivable before estimating the model. The tabulated results are robust to using this model.

4.4 Going Concern Measure

The second proxy for audit quality is the likelihood of getting a going concern opinion, which is measured using a logistic regression model like the one proposed by Reichelt and Wang (2010).[2] We limit the sample to distressed firms and employ a pre/post and difference-in-differences analyses to estimate the relationship between *GCONCERN* and *REMOTE* as presented in models (4) and (5), respectively[3].

$$GCONCERNi,t = \beta0 + \beta1\ REMOTEi,t + +\Sigma\beta jCONTROLS\ i,t + YEAR\_FE + +INDUSTRY\_\ FE + vi,t \quad (4)$$

$$GCONCERNi,t = \beta0 + \beta1\ POSTi,t + +\beta2REMOTE\ i,t,+ \beta3\ POST*REMOTEi,t + +\Sigma\beta jCONTROLS\ i,t + INDUSTRY\_\ FE + vi,t \quad (5)$$

The dependent variable is an indicator variable that takes the value of "1" if the auditor issued a going-concern opinion. The variable of interest and control variables in equations (4) and (5) are as previously defined in equations (2) and (3), and *INDUSTRY FE* are industry fixed effects

[2] There is a concern that the going concern opinion measure is affected by the pandemic related financial impacts on businesses. Since the test sample is 2019 fiscal year-end audits filed from March-April 2020 at the onset of the pandemic, firms were unlikely to have felt the difficulties still. The high degree of uncertainty surrounding how long the pandemic would last, taken together with the fact that clients of all industries were affected equally, would result in auditors facing the decision to issue going concern opinions for all clients if at all. Given the severity of a going concern opinion, along with the issue that both clients and firms were unable to foresee the impacts of the pandemic throughout the next 12 months at the time, it is unlikely that an auditor would be able to provide the evidence to ascertain the conclusion of issuing a modified going concern opinion based on pandemic reasons alone. Still, we consider that no single measure of audit quality is without flaw, and thus we assess the results of this measure in combination with two other measures to reach a reliable conclusion on the tested hypothesis.

[3] We limit the sample for going concern analyses to only distressed firms, which are defined as firms with either negative cash flows or negative income. We include firm-years that meet the criteria using either definition in the sample. Prior studies assert that going concern assessment is a more salient decision in distressed firms (DeFond, Raghunandan, and Subramanyam 2002). Thus, limiting the sample to distressed firms aims to mitigate concerns that the going concern opinion is for pandemic related reasons.

based on two-digit SIC codes. Detailed variable definitions and data sources are included in the *Appendix*.

4.5 Meet or Beat Analyst Forecasts Measure

The final proxy for audit quality is the client's propensity to meet or beat analysts' earnings forecasts, similar to the one proposed by Reichelt and Wang (2010). We employ a pre/post and difference-in-differences analyses to estimate the relationship between *MEET* and *REMOTE* as presented in models (6) and (7), respectively.

$$MEET_{i,t} = \beta 0 + \beta 1\ REMOTE_{i,t} + \Sigma \beta j CONTROLS_{i,t} + \\ + YEAR\_FE + INDUSTRY\_FE + v_{i,t} \quad (6)$$

$$MEET_{i,t} = \beta 0 + \beta 1\ POST_{i,t} + \beta 2 REMOTE_{i,t} + \\ + \beta 3\ POST*REMOTE_{i,t} + \Sigma \beta j CONTROLS_{i,t} + \\ + INDUSTRY\_FE + v_{i,t}, \quad (7)$$

The dependent variable is an indicator variable that takes the value of "1" if the clients' earnings meet or beat the median consensus forecast by one cent. The variable of interest and control variables in equations (6) and (7) are as previously defined in equations (2) and (3), and *INDUSTRY FE* are industry fixed effects based on two-digit SIC codes. Detailed variable definitions and data sources are included in the *Appendix*.

5. Empirical Results

5.1 Sample Selection

Table no. 1 details the sample selection procedure. We begin with Audit Analytics and Compustat data from 2017 through 2020 containing 13,788 firms (32,498 firm-years) to obtain variables for the main analyses for the period from 2018 through 2020. We remove 5,694 firms (12,484 firm-years), representing duplicates and observations with missing variable data. We further exclude 1,283 firms (3,161 firm-years), which represent non-US firms and financial firms with SIC codes 6000-6999. We also remove 2,071 firms (4,777 firm-years) with non-December year ends. After creating variables and winsorizing all continuous variables at the 1 and 99 percent level, the full sample includes 1,761 firms (4,483 firm-years).

Table no. 1. Sample Selection

	Unique Firms	Firm-Years
Audit Analytics and Compustat data	13,788	32,498
Less: Duplicates and firms with missing variable data	(5,694)	(12,484)
Less: Non-US firms and financial firms (SIC codes 6000-6999)	(1,283)	(3,161)
Less: Non-December year end	(2,071)	(4,777)
Less: Observations used to create variables	(2,979)	(7,593)
Full Sample	**1,761**	**4,483**
Panel A: Sample for Absolute Discretionary Accruals Analysis		
Less: Firms with less than 20 observations in 2-digit SIC industry-year group	(357)	(904)
Final Sample	**1,404**	**3,579**
Panel B: Sample for Going Concern Opinion Analysis		
Limit to distressed firms	(914)	(2,799)
Final Sample	**847**	**1,684**
Panel C: Sample for Meet or Beat Analysts' Earnings Forecasts Analysis		
Merge with IBES and create variables	(878)	(2,246)
Final Sample	**883**	**2,237**

This table presents the sample selection procedure for the analyses of the three proxies for audit quality: absolute discretionary accruals, going concern opinions, and meet or beat analysts' earnings forecasts. Note the final sample in panels A, B, and C are calculated using the full sample.

Source: own projection

Table no. 2. Sample Descriptive Statistics

	REMOTE = 1			REMOTE = 0		
Panel A: Analyses of Absolute Discretionary Accruals (N = 132 for REMOTE = 1 and N = 3,447 for REMOTE = 0)						
	Mean	**Std. Dev.**	**Median**	**Mean**	**Std. Dev.**	**Median**
ADA	0.062	0.144	0.035	0.103***	0.129	0.066***
BIG4	0.183	0.388	0.000	0.715***	0.452	1.000***
LOGMKT	3.493	1.297	3.375	6.933***	2.308	7.057
LEV	0.660	0.874	0.567	0.589	0.362	0.562
ROA	-0.333	0.528	-0.148	-0.106***	0.420	0.015
ROAL	-0.376	0.695	-0.116	-0.109***	0.373	0.014***
LOSS	0.763	0.427	1.000	0.442***	0.497	0.000***
CFO	-0.220	0.456	-0.081	-0.026***	0.370	0.064***
BTM	-3.845	47.083	0.650	0.297	6.023	0.337***
ABSACCRL	0.011	0.038	0.002	0.002**	0.011	0.000***
GROWTH	0.457	4.492	-0.030	0.822	15.029	0.066***
ALTMAN	-6.787	25.736	-0.321	2.178***	13.717	2.194***
STDEARN	45.263	263.499	6.160	233.429***	881.204	27.243
TENURE	0.649	0.479	1.000	0.550*	0.498	1.000*
Panel B: Analyses of Going Concern Opinions (N = 170 for REMOTE = 1 and N = 1,514 for REMOTE = 0)						
	Mean	**Std. Dev.**	**Median**	**Mean**	**Std. Dev.**	**Median**
GCONCERN	0.376	0.486	0.000	0.126***	0.332	0.000***
BIG4	0.220	0.415	0.000	0.620***	0.486	1.000***
LOGMKT	3.746	1.395	3.586	5.666***	2.011	5.738***
LEV	0.704	0.799	0.591	0.614	0.443	0.553
ROA	-0.421	0.572	-0.222	-0.310*	0.531	-0.137*
ROAL	-0.442	0.688	-0.230	-0.288*	0.466	-0.137
LOSS	0.925	0.264	1.000	0.956	0.206	1.000
CFO	-0.287	0.488	-0.111	-0.186	0.483	-0.034
BTM	-2.942	41.088	0.588	0.112	8.947	0.355
ABSACCRL	0.011	0.037	0.002	0.004**	0.014	0.000***
GROWTH	0.872	7.577	-0.055	1.586	22.377	0.053**
ALTMAN	-7.604	24.368	-1.086	-0.654***	18.665	0.896
STDEARN	44.300	232.547	6.504	118.632***	455.488	16.716***
TENURE	0.665	0.473	1.000	0.492***	0.500	0.000***
Panel C: Analyses of Meet or Beat Analysts' Earnings Forecasts (N = 61 for REMOTE = 1 and N = 2,176 for REMOTE = 0)						
	Mean	**Std. Dev.**	**Median**	**Mean**	**Std. Dev.**	**Median**
MEET	0.033	0.180	0.000	0.148***	0.355	0.000***
BIG4	0.492	0.504	0.000	0.829***	0.376	1.000***
LOGMKT	6.128	2.440	5.479	7.870***	1.886	7.831***
LEV	0.598	0.236	0.612	0.584	0.270	0.576
ROA	-0.057	0.243	-0.019	0.011*	0.164	0.040*
ROAL	-0.041	0.229	0.021	0.010	0.165	0.039
LOSS	0.525	0.504	1.000	0.246***	0.431	0.000***
CFO	0.032	0.196	0.061	0.069	0.138	0.084*
BTM	0.992	3.474	0.426	0.429	2.356	0.369***
ABSACCRL	0.002	0.011	0.000	0.000	0.001	0.000***
GROWTH	0.012	0.172	-0.025	0.142***	0.800	0.059***
ALTMAN	3.020	5.940	2.477	3.767	5.343	2.813
STDEARN	180.769	589.947	16.923	326.978	986.092	45.917*
TENURE	0.869	0.340	1.000	0.591***	0.492	1.000***

The table includes descriptive statistics (number of observations, mean, median, and standard deviation) for the dependent variables and control variables in analyses of absolute discretionary accruals (Panel A), going concern opinions (Panel B), and meet-or-beat (Panel C). ***,**,* indicate whether the means (medians) are significantly different across the remote and not remote samples at the 0.01, 0.05, and 0.10 levels, respectively, based on t-tests (Wilcoxon signed rank tests).

Source: own projection

We use the full sample as a starting point and limit the sample for each individual analysis as necessary. In the discretionary accruals analysis, we remove firms with less than 20 observations in the 2-digit SIC industry-year group. In the going concern opinion analysis, we limit to distressed firms. In the meet-or-beat analysis, we merge with IBES. This results in final samples of 1,404 firms (3,579 firm-years), 847 firms (1,684 firm-years), and 883 firms (2,237 firm-years) for the discretionary accruals, going concern, and meet-and-beat analyses respectively.

5.2 Descriptive Statistics

Table no. 2 provides descriptive statistics comparing the characteristics of the remote (*REMOTE*=1) and non-remote (*REMOTE*=0) sample. We include variables that have been identified in prior research as important determinants of absolute discretionary accruals, likelihood of getting a going concern opinion, and likelihood of meeting or beating analysts' forecasts in Panels A through C respectively.

Panel A shows the descriptive statistics for the sample used for the discretionary accruals analyses. The sample consists of 3,579 firm-year observations in total, including 132 observations in the *REMOTE* audit sample. Panel B shows the descriptive statistics for the sample used for the going-concern opinion analyses. The sample consists of 1,684 firm-year observations total, including 170 observations in the *REMOTE* audit sample. After limiting the sample to only distressed firms in the going concern analyses, there is no significant difference between operating leverage (*LEV*), likelihood of negative net income (*LOSS*), and operating cash flows (*CFO*) in the remote and non-remote samples, alleviating concerns about the difference in the characteristics affecting the auditor's assessment of the going concern, and subsequent likelihood of receiving a going concern opinion between the two samples.

Panel C shows the descriptive statistics for the sample used for the meet or beat analyst earnings forecast analysis. The sample consists of 2,237 firm-year observations in total, including 61 observations in the *REMOTE* audit sample. Consistent across Panels A through C, firms in the non-remote sample are larger (*LOGMKT*), more likely to be audited by Big-4 (*BIG4*) compared to the remote sample. The numerous differences in the firm characteristics of remote vs. non-remote in the univariate analyses shown illustrate the need to control for these characteristics in the multivariate analyses. Certain differences, such as those noted above, may be attributed to the inclusion of accelerated-filers and non-accelerated filers in the remote sample vs. large-accelerated and accelerated filters in the non-remote sample. To address these differences, we run an additional robustness test limiting the sample to only accelerated filers in both groups as shown in Section 6.

5.3 Discretionary Accruals- Pre/Post and Difference-in-Differences Analyses

Table no. 3 presents the results of the pre/post analyses (columns 1 and 2) and difference-in-differences regression analyses (columns 3 and 4) using the absolute value of discretionary accruals as the dependent variable. In column (1) the coefficient for *REMOTE* is -0.018 and statistically significant at the 5% level. Thus, after controlling for client and auditor characteristics, remote audits have 1.8% lower absolute discretionary accruals compared to non-remote audits.

Table no. 3. Analyses of Absolute Discretionary Accruals

		Pre/Post		Diff-in-Diff	
		(1)	(2)	(3)	(4)
DV = Absolute Discretionary Accruals (*ADA*)	**Expected sign**	**Estimate**	**z-stat**	**Estimate**	**t-stat**
REMOTE	(+/-)	-0.018**	(-2.39)	0.009	(1.59)
POST	(+/-)			-0.001	(-0.30)
POST×REMOTE	(+/-)			-0.026***	(-2.97)
BIG4	(-)	-0.001	(-0.26)	-0.004	(-0.88)
LOGMKT	(-)	-0.009***	(-6.42)	-0.006***	(-5.22)
LEV	(+)	0.025***	(4.34)	0.024***	(4.86)
ROA	(+)	0.064***	(7.18)	0.071***	(8.19)

ROAL	(-)	-0.040***	(-6.44)	-0.030***	(-4.50)
LOSS	(-)	0.009*	(1.88)	0.006	(1.41)
CFO	(-)	-0.037***	(-3.60)	-0.039***	(-3.90)
BTM	(+/-)	0.000	(0.10)	0.000	(-0.15)
ABSACCRL	(+/-)	1.191***	(6.48)	2.196***	(13.63)
GROWTH	(+/-)	0.000	(0.55)	0.000	(0.11)
ALTMAN	(+/-)	0.000***	(-3.21)	0.000***	(-5.77)
STDEARN	(+/-)	0.000	(1.60)	0.000	(1.45)
TENURE	(+/-)	0.000	(-0.22)	0.002*	(-1.94)
Constant		0.114***	(11.23)	0.876***	(10.58)
Industry F.E.		Included		Included	
Year F.E.		Included		Excluded	
Observations		3,579		3,579	
R-Square		0.178		0.221	

This table presents the results of the pre/post and difference-in-difference analyses using discretionary accruals as the dependent variable. All models are estimated using OLS regression. Standard errors are clustered by firm and all continuous variables are winsorized at the 1 and 99 percent levels. Variable definitions are included in the appendix. ***, **, * indicate significance at the 0.01, 0.05, and 0.10 levels, respectively, using two-tailed tests.

Source: own projection

In the difference-in-differences regression model, the coefficient for *REMOTE* in column (3) is 0.009 and not statistically significant, indicating no significant difference between the treatment and control group. The coefficient for the interaction term *POST×REMOTE* is -0.026 and statistically significant at the 1% level. This evidence suggests that auditing remotely is associated with lower absolute discretionary accruals. The coefficients for *LOGMKT* and CFO are negative and significant, consistent with lower discretionary accruals expected for larger clients and clients with greater operating cash flows. Overall, the results are consistent with audit quality increasing with remote work.

5.4 Going Concern Opinions- Pre/Post and Difference-in-Differences Analyses

Table no. 4 presents the results of the pre/post and difference-in-difference regression analyses using going concern as the dependent variable. In column (1) the coefficient for *REMOTE* is 1.041 and statistically significant at the 1% level. This evidence suggests that, after controlling for client characteristics, remote audits have a greater propensity to issue a going concern opinion compared to non-remote audits. These results are consistent with the analyses presented in **Table no. 3**, which find that remote audits are associated with an increase in audit quality. To evaluate the economic significance of the regression results, we consider the odds ratio estimates. For *REMOTE*, the positive coefficient leads to an odds ratio greater than 1 (2.834), suggesting that a remote audit has more than twice the chance of issuing a going concern opinion compared to a non-remote audit. These results are highly material from an economic standpoint since a going concern modified audit opinion is the auditor's professional assessment regarding the risk that the client may not continue in business in the foreseeable future, a serious concern to investors, lenders, and other stakeholders. Moreover, prior research demonstrates that a going concern modification significantly alters the structure of the market valuation for financially distressed firms (Blay, Geiger, and North 2011).

In the difference-in-differences regression model, the coefficient in column (3) for *REMOTE* is -0.019 and not statistically significant, indicating no significant difference between the treatment and control group. The coefficient for the interaction term *POST×REMOTE* is 0.062 and statistically significant at the 5% level, suggesting that remote audits are more likely to result in a modified going concern outcome. The coefficients for *LOGMKT* and *BTM* are negative and significant, consistent with the expectation that larger firms, and firms with higher book-to-market ratios have a lower probability of a going concern audit outcome. The coefficient for *LEV* is positive and significant, consistent with the expectation that the likelihood of a going concern opinion increases for clients as risk and leverage increase. Overall, the combined evidence suggests that, after controlling for differences in audit firm and client characteristics, audit quality increases with remote auditing in the difference-in-differences analysis.

Table no. 4. Analyses of Going Concern Opinions

	Pre/Post		Diff-in-Diff	
	(1)	(2)	(3)	(4)
DV = Going Concern Opinion (*GCONCERN*)	**Estimate**	**z-stat**	**Estimate**	**t-stat**
REMOTE	1.041***	(3.38)	-0.019	(-0.96)
POST			0.008	(0.45)
POST×REMOTE			0.062**	(1.99)
BIG4	0.081	(0.28)	0.004	(0.27)
LOGMKT	-0.673***	(-7.86)	-0.050***	(-9.98)
LEV	1.170***	(4.64)	0.101***	(6.37)
ROA	-0.948***	(-2.67)	-0.149***	(-5.66)
ROAL	-0.596**	(-2.21)	-0.106***	(-5.24)
LOSS	0.652	(1.14)	0.001	(0.03)
CFO	-0.680	(-1.44)	-0.019	(-0.64)
BTM	-0.014	(-1.26)	-0.001***	(-3.19)
ABSACCRL	11.038	(1.45)	0.902*	(1.88)
GROWTH	0.000	(0.08)	-0.000	(-0.39)
ALTMAN	0.003	(0.70)	0.000	(0.21)
STDEARN	0.001***	(4.33)	0.000***	(4.54)
TENURE	-0.125	(-0.49)	0.005	(0.36)
Constant	-0.946	(-1.29)	0.289***	(5.60)
Industry F.E.	Included		Included	
Year F.E.	Included		Excluded	
Observations	1,684		1,684	
Pseudo R-Square	0.438		0.362	

This table presents the results of the pre/post and difference-in-difference analyses using going concern opinions as the dependent variable. All models are estimated using logistic regression. Standard errors are clustered by firm and all continuous variables are winsorized at the 1 and 99 percent levels. Variable definitions are included in the appendix. ***, **, * indicate significance at the 0.01, 0.05, and 0.10 levels, respectively, using two-tailed tests.

Source: own projection

5.5 Meet-or-Beat- Pre/Post and Difference-in-Differences Analyses

Table no. 5 presents the results of the pre/post and difference-in-difference regression analyses using meet or beat analysts' earnings forecasts as the dependent variable. In column (1) the coefficient for *REMOTE* is -1.741 and statistically significant at the 5% level. This evidence suggests that, after controlling for client characteristics, remote audits are related to a lesser propensity to meet or beat forecasts compared to non-remote audits. These results are consistent with the analyses presented in **Tables 3 and 4**, which find that remote audits are associated with an increase in audit quality. To assess the economic importance of the regression results, we compute the odds ratio estimates. The negative coefficient for *REMOTE* leads to an odds ratio of less than 1 (.175), suggesting that a remote audit has about 18% chance of the client meeting or beating analysts' consensus forecast. Prior research suggests that companies who manage to meet or beat their earnings expectations benefit from a higher return than peers that do not (Bartov, Givoly, and Hayn, 2002). Thus, the *REMOTE* coefficient is economically as well as statistically significant.

In the difference-in-differences regression model, the coefficient for *REMOTE* in column (3) is -0.377 and not statistically significant, indicating no significant difference between the treatment and control group. The coefficient for the interaction term *POST×REMOTE* is -0.791 and statistically significant at the 5% level, suggesting that firms audited remotely are more likely to meet or beat analysts' consensus forecasts. The positive and significant coefficient for *LOGMKT* suggests that clients are more likely to meet or beat analysts' consensus forecasts if they are larger. On the other hand, clients are less likely to meet or beat analysts' consensus forecasts if they rely

more on the debt market to obtain financing (*LEV*) and if auditor characteristics constrain management, as suggested by the negative and significant coefficient for *TENURE*. Overall, this study finds that after controlling for differences in audit firm and client characteristics, firms are less likely to meet or beat earnings forecasts when audits are conducted remotely, which is interpreted as an increase in audit quality.

Table no. 5. Analyses of Meet or Beat Analysts' Earnings Forecasts

	Pre/Post		Diff-in-Diff	
	(1)	(2)	(3)	(4)
DV = Meet or Beat (*MEET*)	**Estimate**	**z-stat**	**Estimate**	**t-stat**
REMOTE	-1.741**	(-2.24)	-0.377	(-1.43)
POST			-0.032	(-0.21)
POST×REMOTE			-0.791**	(-1.33)
BIG4	-0.117	(-0.63)	-0.156	(-0.83)
LOGMKT	0.071	(1.46)	0.047	(0.93)
LEV	-0.698**	(-2.30)	-0.699**	(-2.29)
ROA	0.360	(-0.41)	0.480	(0.55)
ROAL	-0.450	(-0.79)	-0.458	(-0.80)
LOSS	-0.013	(-0.07)	0.006	(0.03)
CFO	0.138	(0.15)	0.006	(0.01)
BTM	-0.009	(-0.36)	-0.008	(-0.33)
ABSACCRL	27.871	(1.08)	22.198	(0.89)
GROWTH	-0.051	(-0.55)	-0.046	(-0.51)
ALTMAN	-0.034**	(-2.15)	-0.035**	(-2.23)
STDEARN	0.000	(1.60)	0.000*	(1.75)
TENURE	-0.269**	(-2.18)	-0.277**	(-2.00)
Constant	-1.467**	(-2.41)	-1.218	(-1.56)
Industry F.E.	Included		Included	
Year F.E.	Included		Excluded	
Observations	2,237		2,237	
Pseudo R-Square	0.048		0.048	

This table presents the results of the pre/post and difference-in-differences analyses using meeting or beating analysts' earnings forecasts as the dependent variable. All models are estimated using logistic regression. Standard errors are clustered by firm and all continuous variables are winsorized at the 1 and 99 percent levels. Variable definitions are included in the appendix. ***, **, * indicate significance at the 0.01, 0.05, and 0.10 levels, respectively, using two-tailed tests.

Source: own projection

6. Robustness Checks

6.1 Auditor Change

Prior studies find an increase in audit quality in the first year immediately after auditor change. However, results are mixed in the literature on audit firm rotation[1]. To preserve the sample size of the main analyses, we do not exclude observations for firms that switched auditor in the prior year. In untabulated analyses, we re-estimate the model after controlling for auditor change and find that the results from the main analyses are robust to this specification. The coefficients for *REMOTE* remain significant and are directionally consistent with the findings in the primary analyses. Notably, the coefficient for *CHG_AUDITOR* is significant for one measure of audit quality (*MEET*) and not the others (*ADA, GCONCERN*). The results suggest audit quality is increasing with first-year audits when proxied by meet-or-beat, but not when proxied by discretionary accruals or going concern

[1] Several studies on audit firm rotation find no significant difference in audit quality measured by discretionary accruals (Jackson, Moldrich, and Roebuck 2008). However, another study finds auditors are more likely to issue a going concern opinion during the first-year financial statement audit (Kim, Lee, and Lee 2015).

opinions. The findings are consistent with the current literature on audit firm rotation, which finds mixed results on its association with audit quality.

6.2 Accelerated Filers

In Table no. 6 we use an alternative research design for the treatment and control group and rerun the pre/post analyses from the main analyses shown in Tables 3-5. We remove any large-accelerated filers, which are firms that file before March 1, 2020, and non-accelerated filers, which are firms that file after March 31, 2020. The remaining treatment and control group consists of only accelerated filers. The control group is all firms that file from March 1, 2020, to March 12, 2020, and the treatment group is as previously defined, all firms filing after March 13, 2020. This analysis addresses concerns about the differences between filer types in the original design. The variable of interest *REMOTE* is significant across all three measures of audit quality after limiting the sample to accelerated filers only.

Table no. 6. Accelerated Filers Only

	(1)	(2)
Panel A: DV = *ADA*	**Estimate**	**z-stat**
REMOTE	-0.021**	-2.13
Controls	Included	
Constant	0.219***	9.71
Industry F.E.	Included	
Year F.E.	Included	
Observations	1,109	
R-Square	0.175	
Panel B: DV = *GCONCERN*		
REMOTE	1.086***	3.30
Controls	Included	
Constant	-0.771	-1.00
Industry F.E.	Included	
Year F.E.	Included	
Observations	1,092	
R-Square	0.3650	
Panel C: DV = *MEET*		
REMOTE	-0.110*	-1.89
Controls	Included	
Constant	0.168	0.60
Industry F.E.	Included	
Year F.E.	Included	
Observations	653	
Pseudo R-Square	0.080	

This table presents the results for the analyses with a sample of only accelerated filers. Standard errors are clustered by firm and all continuous variables are winsorized at the 1 and 99 percent level. Variable definitions are included in the appendix. ***, **, * indicate significance at the 0.01, 0.05, and 0.10 levels, respectively, using two-tailed tests.

Source: own projection

Overall, the regression models used reject the null hypothesis; the data show a difference in audit quality between remote and in-person audits. In particular, our analyses suggest that audits conducted remotely are of improved quality compared to audits conducted in person. Our results differ from prior studies that show a decline or no change in audit quality using the pandemic as a setting (Gong et al., 2022; Lin et al., 2024). These differences can be attributed to the distinction in sample and research methodology across studies. Gong et al. (2022) use

restatements as a measure for audit quality, while our study uses going concern and meeting or beating analysts' forecasts. Each measure is simply a proxy for audit quality, and thus it is important to consider findings across different measures. Moreover, Lin et al. (2024) use Chinese data, while our study uses U.S. firms; thus, findings may not be generalizable to other countries. The difference in results is consistent with our expectations and with Lund et al. (2021) who find that remote work varies across different economies. Ultimately, our findings are consistent with the literature citing the benefits of remote work (Felstead and Henseke 2017; Ferreira et al. 2021; Li et al. 2023; Raghuram et al., 2001).

7. Conclusion

The option to work from home has long been sought after by employees; however, opponents are quick to raise concerns regarding its potential costs, including a decrease in the quality of work produced. This paper examines whether audits conducted from home are associated with a change in audit quality using the national state of emergency declared during the COVID-19 pandemic as a natural experimental setting.

The analyses suggest that working remotely is associated with an increase in audit quality. The findings are consistent with all proxies for audit quality, including discretionary accruals, going concern, and meet or beat analysts' forecasts. To mitigate potential endogeneity concerns, we employ a difference-in-differences research design and find the results to be quantitatively similar. These findings have important implications for the audit practice, signaling that audit firm leaders ought to continue investing in technology that allows for greater work flexibility to overcome talent retention challenges[1].

While technology and other startup costs are required for remote audits, our study supports that the benefits outweigh the costs. From a practical standpoint, remote audits offer several attractive benefits, including future cost savings, improved flexibility, and lower environmental impacts. First, since audit firms are concerned with maximizing profits, remote work would lead to reduced travel expenses, lower administrative burden spent on travel logistics, and potentially lower audit fees to attract a greater share of the client market. Second, remote audits offer an improvement in flexibility since specialized auditors can be connected from across the nation, regardless of their physical location, possibly increasing audit quality and client service. Auditors would also be able to work on their own schedules and save time that would otherwise be spent on commute. Third, remote audits can help support audit firm sustainability initiatives by reducing travel and thereby contributing to a smaller carbon footprint.

Overall, the findings in this study support the argument that audit quality is improving with remote work, which serves to benefit the proponents of working from home by alleviating concerns posed by those practitioners and regulators who prefer the traditional workplace setting. One strength of our study is the generalizability of the results, since the sample is not limited to certain industries. This supports that auditors can work effectively in a remote setting across various client industries. Although we use theory to identify parts of the audit process that are impacted by remote work and observe an increase in audit quality overall, we acknowledge that a limitation of the archival research design is that we are unable to pinpoint how specific aspects of the audit process change with remote work. Future experimental research designs might complement this study in order to shed light on those aspects. Additionally, while we control for the determinants of audit quality, there may be other omitted variables both related and unrelated to the pandemic that future studies can explore. Furthermore, this study discusses only the short-term impact of remote audits, leaving room to investigate the long-term post-pandemic effects as a possible extension.

Finally, since the current landscape seems to be indicating a trend toward greater workplace flexibility, this study urges future research in this direction to pave the way to our understanding of the consequences of remote work as it relates to audit quality and financial reporting.

[1] The AICPA 2022 CPA Firm Top Issues Survey reveals that finding qualified staff and retaining qualified staff are among the top two issues affecting firms (AICPA 2022).

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Appendix

Variable definitions

Variable	Definitions	Database
AC	(cash flow from operations – income before extraordinary items)/average total assets	Compustat
ABS(ACCRL)	(absolute value of total accruals$_{t-1}$)/average total assets$_{t-1}$	Compustat
ADA	absolute discretionary accruals estimated using the cross-sectional Jones (1991) model, including ROA as per Kothari et al. (2005), estimated by industry-year	Compustat
ALTMAN	Altman (1983) financial distress score	Compustat
BIG4	an indicator variable which takes the value of "1" if the client has a Big-4 auditor, and "0" otherwise	Audit Analytics
BIG_R	"1" if the current year financial statements (2017-2019) contain a misstatement that materially misstatements the financial statements, resulting in a "Big R" or re-issuance restatement in a future period (2018-2022), and "0" otherwise	Audit Analytics
BTM	(book value of equity)/market value of equity	Compustat
CFO	(cash flow from operations)/average total assets	Compustat
COUNT_WEAK	number of material weaknesses in the fiscal year	Audit Analytics

GCONCERN	"1" if the auditor gave a going-concern opinion to a client in the fiscal year, and "0" otherwise	Audit Analytics
GROWTH	$(sales_t - sales_{t-1})/sales_{t-1}$	Compustat
LEV	(total liabilities)/average total assets	Compustat
LITTLE_R	"1" if the current year financial statements (2017-2019) contain a misstatement that is immaterial to the financial statements, resulting in a "Little R" or revision restatement in a future period (2018-2022), and "0" otherwise	Audit Analytics
LOGMKT	natural logarithm of market value	Compustat
LOSS	an indicator variable which takes the value of "1" if net income is negative, and "0" otherwise	Compustat
MEET	"1" if the client's earnings meet or beat the median consensus forecast by one cent, and "0" otherwise	IBES
POST	Diff-in-Diff Analyses: an indicator variable for the post period, which takes the value of "1" for 12/31/19 year end audit, and "0" otherwise	None
PPE	gross property, plant, and equipment/average total assets	Compustat
REMOTE	Pre/Post Analyses: an indicator variable which takes the value of "1" if the audit filing date is after 3/13/20, and "0" otherwise Diff-in-Diff Analyses: an indicator variable for the treatment group, which takes the value of "1" if the audit filing date after 3/13, and "0" otherwise	None
ROA	(net income before extraordinary items)/average total assets	Compustat
ROAL	$(net\ income_{t-1})/average\ total\ assets_{t-1}$	Compustat
STDEARN	standard deviation of income before extraordinary items in the past four years	Compustat
TENURE	an indicator variable which takes the value of "1" if the client has kept the same auditor for three or more fiscal years, and "0" otherwise	Audit Analytics