

The audit in times of a pandemic: Does Covid-19 impact audit quality?

Master thesis Accounting, Auditing and Control

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Abstract

Purpose – This research aims to examine whether audit quality is affected by Covid-19.

Design/methodology/approach – Data from the US is used pre- and during Covid to test regressions on audit quality and Covid-19, including the effect of auditor type, and audit engagement partner gender.

Findings – The results suggest that audit quality in general is not affected by Covid-19. I find that audit quality for Big 4 auditors is higher during Covid-19, but further analysis shows a possible endogeneity problem where already better performing companies choose a Big 4 auditor. Audit quality is not different across audit engagement partner genders during Covid.

Practical implications – Since audit quality was not significantly impacted by Covid-19, investors, company boards and regulators do not need to take extra measures. Auditors should maintain their current measures to maintain audit quality.

Originality/value – This research contributes to existing literature on the effect of Covid-19 on audit quality by using a more extensive sample and sample period. It is the first empirical research on the effect of the audit engagement partner gender on audit quality during Covid-19 in the US.

Keywords – Audit quality, Covid-19, Big 4 auditors, Female audit engagement partners

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1. Introduction

The Covid-19 outbreak starting by the end of 2019 swept the world for more than two years, damaging lives and economies around the world (Hao et al., 2022). The pandemic impacted organizations of all sizes across all industries (Arnold, 2020), accounting and auditing being no exception (Association of Chartered Certified Accountants, 2020). It created the biggest challenge to auditors and their stakeholders since the global financial crisis in 2007 and 2008 (Albitar et al., 2020). As a consequence, the financial reporting quality decreased during the pandemic (Hsu & Yang, 2022). The uncertainty about the pandemic itself, the widespread effect on sales, supply chain and financial markets add significant uncertainties to the financial statements (Deloitte, 2020). In these uncertain times the job of the external auditor becomes more important than ever, since the audit provides confidence in the truthfulness of the financial reporting to investors, thereby allowing for transparency and accountability in capital markets (Li et al., 2023). Maintaining high audit quality is important therefore, even more so during the uncertain times caused by Covid-19. This leads to the following research question:

Does Covid-19 impact audit quality?

The answer to this question is of importance to the stakeholders; including investors, company management, regulators, creditors, employees and suppliers. In order to maintain a high audit quality during the pandemic, new ways of working were adopted (KPMG, 2021); auditors exchanged the daily client sites for their own living rooms. Interaction with the rest of the audit team and the client had to be adapted into virtual communication. The audit culture where young auditors learn from coaching and doing is difficult to do remotely. This led to new ways of coaching, managing and providing feedback. Virtual training modules and on-demand learning were implemented. Finally, the pandemic fast-tracked the digital transformation of the audit with the rollout of next generation technologies such as machine learning, cognitive computing and artificial intelligence (Butaka, 2022).

The pandemic also reshaped how auditors complete their inspection of financial reports (Huang, 2023), in order to maintain the high audit quality to stakeholders and therefore secure the reliability of the financial statements. The PCAOB advised auditors to consider the following amongst others; revision of the auditor's risk assessment and materiality, re-evaluation of the internal controls and accounting estimates (PCAOB, 2020b), gathering sufficient, appropriate audit evidence allowing for extra procedures; and the assessment of going concern (PCAOB, 2020a).

Last but not least the pandemic impacted the auditors personally; first of all, auditors were at risk of getting Covid-19 themselves. This results in a higher sickness rate and therefore more work pressure on the auditors still working. Secondly, working from home causes higher stress levels (Delfino & Van Der Kolk, 2021) and ultimately disengagement from the job (Bergefurt et al., 2021). Thirdly, the so-called great resignation took place due to Covid; a staggering 47 million Americans voluntarily quit their jobs (Fuller & Kerr, 2022). The pandemic caused a shift in priorities of employees and many left their job as a result of the way their employer treated them during the pandemic (Morgan, 2021). This led to staff shortage in all industries during the pandemic, but especially in the accounting profession (Ho, 2023). It even led to a decline in the number of students majoring accounting, which means a further shortage of

available auditors in the future (Ho, 2023). This shortage of available labour increased the work pressure and auditor stress even more.

All of these changes in the audit industry could potentially influence audit quality. In order to examine whether Covid-19 impacts audit quality, three regression models are performed. The first regression tests the effect of Covid-19 on audit quality in general. Research indicates that audit quality is also affected by the type of audit firm performing the audit, a difference is especially found between Big 4 and non-Big 4 auditors (Eshleman & Guo, 2014). The majority of previous research finds that audit quality is higher for Big 4 auditors (Che et al., 2020). Therefore the second regression tests the impact of the type of audit firm on audit quality during Covid-19. Thirdly, research shows that the type of audit engagement partner also affects audit quality (Khlif & Achek, 2017). Audits performed by female auditors are found to have a higher audit quality compared to male auditors (Hardies et al., 2016). Therefore the third regression tests the impact of the type of audit engagement partner on audit quality during Covid-19. Audit quality is measured by 10-K restatements, while the type of audit firm and audit engagement partner are obtained via Form AP disclosures.

Using a sample of 9.514 observations of US firms in the period 2018-2021, I find that audit quality in general does not decline significantly during Covid-19 in the US. The type of audit firm seems to matter in the impact of Covid-19 on audit quality; Big 4 auditors maintain high quality while audit quality decreases for clients of non-Big 4 auditors during Covid-19. Further analysis shows a possible endogeneity problem however, where better performing firms tend to choose big4 auditors and Big 4 auditors tend to accept better performing firms more easily as clients. Finally, the audit engagement partner gender does not impact audit quality significantly during Covid-19.

Several studies have already been done on (aspects of) the effect of Covid-19 on audit quality in the US, specifically on the effect of working from home (Causholli et al., 2022; Thompson, 2022). The general effect of Covid-19 on audit quality also has been examined, but these all have limited samples/sample periods (Gong et al., 2022; Harjoto & Laksmana, 2023; Li et al., 2023; Morris et al., 2023). The sample used in this research contains a larger sample and longer sample period than previous studies. This means the results do not only take into account the initial shock of Covid-19 on audit quality, but also the possible adaption of the auditors to the new situation. As the findings indicate, the overall audit quality did not decline during Covid-19. It seems that auditors have adapted to the new situation. The implications of this research are that audit firms should continue their learning programs and audit procedures to maintain the audit quality. Investors do not have to be more cautious using audit reports during Covid-19, and regulators do not have to implement more rules or give advice to auditors on maintaining high audit quality in times of crises like the pandemic.

The rest of this thesis is organized as follows. The following section contains a literature review and hypothesis development. The third section contains the research design and sample selection. The fourth contains the data descriptives, results and additional analysis. In the last section conclusions are drawn.

2. Literature review and hypothesis development

The pandemic majorly impacted the audit industry. New ways of working were implemented; working from home, less interaction with the clients, less face-to-face coaching of young auditors, and digital transformations took place. The audit procedures changed with regards to the audit risk assessment, materiality, re-evaluation of internal controls and accounting estimates. Extra procedures were performed and going concern assessments changed. Auditors were personally affected by the risk of getting Covid themselves, working from home and higher work pressure and stress due to staff shortage.

All of the changes in the audit industry could potentially influence audit quality. Albitar et al. (2020) argue that the pandemic results in challenges in the completion of the going concern assessment, low levels of reliability and sufficiency of audit evidence and a decline in audit fees. These would all lead to lower audit quality. This is supported by Johnsson and Persson (2021) who find that accurate going concern assessments are more complex due to Covid-19, and therefore pose a threat to audit quality. Mugabe et al. (2022b) find that the majority of the auditors believe that the audit evidence gathered during the pandemic was not credible. The decrease in audit quality caused by Covid-19 is supported by several other scholars (Alharasis et al., 2024; Awaloedin et al., 2024; Morris et al., 2023; Saleem, 2021). On the other hand, Mugabe et al. (2022a) find that South African auditors are confident they were able to overcome the significant challenges that arose due to the pandemic. They were able to gather sufficient and appropriate audit evidence. Huang (2023) states that the pandemic enhanced the auditor's risk awareness, leading to more corrections of major accounting errors in annual reports. The remote audit procedures even had a positive significant effect on audit quality.

Morris and Hoitash (2023) find that audit quality is also affected by auditor health. When an auditor is sick, the demanding nature of the culture of audit firms and busy season may compel employees to go to work. This results in delayed audit reports and a decrease in audit quality. As mentioned before, auditors were also facing the challenge of working from home. Jin et al. (2022) find that, among others, less effective communication and the difficulties in evidence collection cause a decrease in audit quality. Especially audit clients with resource/judgement intensive accounts such as inventory and R&D expenditures are more difficult to audit (Gong et al., 2022). The restrictions on physical and on-site interaction have caused auditors to struggle maintaining a high quality standard; and especially for non-Big 4 audit firms this resulted in lower audit quality. (Gong et al., 2022). When working from home it also becomes easier for auditors to be morally disengaged with the client and the audit firm, eventually leading to lower audit quality (Thompson, 2022). Besides disengagement, working from home also causes auditors stress (Delfino & Van der Kolk, 2021; Bergefurt et al., 2021; Jakovljević & Dmitrović, 2022). It is debatable if stress causes audit quality to decline however, Yan & Xie (2016) and Muidewi et al. (2020) find that auditor stress does not change audit quality, while Asnaahari et al. (2023) find that this stress declines audit quality.

US external auditors themselves are inclined to think that they have adapted to remote or hybrid auditing, however. Li et al. (2023) interviewed several US auditors, who overall stated that the audit quality was not affected by remote working. Causholli et al. (2022) even find that audit quality improved in the US due to working from home. Working remotely can also increase

flexibility and positive perception of work-life balance. There is more time for family, increased flexibility in terms of time and workplace and less physical supervision; which could increase auditor performance (Mustajab et al., 2020). Audit firms are quick to adapt to the new situation by performing livestream walkthroughs, using video conference calls for confidential documents and increasing structured communication within the team and with client personnel (Causholli et al., 2022). Also, clients tend to be more cooperative and responsive during crisis, which leads to timely collection of evidence (Luo & Malsch, 2020). Last but not least, higher workload due to the pandemic could affect the auditor's motivation for the better and improve auditor performance (Soepriyanto et al., 2023). This all potentially increases audit quality (Causholli et al., 2022).

Given the opposing arguments it would be difficult to predict how Covid-19 has influenced audit quality in general. But since the majority of the research is suggesting a negative impact of Covid-19 on audit quality, the following hypothesis is proposed:

H1: Covid-19 impacts audit quality negatively

One of the earliest theories in the audit literature is that Big 4 auditors provide higher audit quality than other auditors (Eshleman & Guo, 2014). Larger audit firms have more reputation to lose by sacrificing their independence on an audit engagement (DeAngelo, 1981). Big 4 auditors exhibit greater conservatism when issuing audit reports (Francis & Krishnan, 1999a). The audit clients of Big 4 auditors also exhibit higher earnings quality, which is shown in the lower magnitude of discretionary accruals (Becker et al., 1998; Francis et al., 1999b). This shows that Big 4 auditors tolerate less earnings management than other auditors. At the same time investors tend to place more weight on the earnings of a firm that has been audited by one of the Big 4 auditors, which shows that investors perceive earnings to be of higher quality (Teoh & Wong, 1993). Last but not least, larger audit firms have more resources to invest in training programs, which results in better trained auditors (Eshleman & Guo, 2014). More recent research enforces these older findings; Big 4 auditors still seem to provide higher audit quality than other auditors (Eshleman & Guo, 2014; Che et al., 2020; Kharuddin et al., 2021; Jain & Agarwalla, 2023).

Big 4 and non-Big 4 firms have different attributes (Daoust et al., 2021), like the resources for training and learning (Che et al., 2020), more in-house consultants and experts for internal support (Francis & Yu, 2009). Hence Big 4 and non-Big 4 companies may differ in their response to the pandemic. Big 4 auditors would be expected to adapt more rapidly to all the changes needed due to Covid-19. Non-Big 4 firms may generally lack the resources and human capital to react quickly and maintain their audit quality (Gong et al., 2022). Before the pandemic, larger offices already invested in technology and started their transformation towards audit automation and artificial intelligence, while smaller offices were less likely to (Harjoto & Laksmana, 2023). The pandemic made gathering audit evidence exceedingly more difficult for smaller practitioners (Mugabe et al., 2022b). Smaller practitioners also performed less audit procedures related to Covid-19 risks compared to larger auditors (Kend & Nguyen, 2022). Due to the abovementioned differences between Big 4 and non-Big 4 auditors, the negative impact of Covid-19 on audit quality is likely to be larger for non-Big 4 auditors. This is supported by several scholars (Gong et al., 2022; Hategan et al., 2022; Harjoto & Laksmana, 2023; Morris et

al., 2023). On the other hand, Herusetya and Halim (2022) find that Covid-19 does not cause a larger decline in audit quality for non-Big 4 firms. Mugabe et al. (2022a) and Hegazy et al. (2022) conclude there is no significant difference in audit quality for Big 4 auditors compared to non-Big 4 auditors.

As a large body of research has shown, audit quality tends to be higher for Big 4 auditors as opposed to non-Big 4 auditors. The moderating effect of Covid-19 however, is unclear. Since most of the abovementioned research finds a larger negative impact of Covid-19 on audit quality for smaller audit companies, the following hypothesis is stated:

H2: The negative impact of Covid-19 on audit quality is smaller for Big 4 companies compared to non-Big 4 companies

Audit quality not only depends on the type of audit firm, but also on the audit engagement partner involved. According to Carcello et al. (1992) audit team member specifics are perceived to be of more importance to audit quality than characteristics of the audit firm. These auditor specific characteristics can be the auditor's education, whether the auditor has worked at an international big audit firm, political affiliation (Gul et al., 2013) and audit experience (Ye et al., 2014). Pittman et al. (2023) find that an audit partner's risk tolerance impacts audit quality, while Nelson and Tan (2005) find that personal characteristics and cognitive style are also of importance. The levels of conservatism (Knechel et al., 2015) and risk preferences (Amir et al., 2014) differ across partners as well. Female auditors are perceived to be more risk-averse compared to their male colleagues (Hardies et al., 2015). Female auditors are also found to be more conservative auditors compared to their male colleagues (Niskanen et al., 2011). Differences between male and female auditors show in the audit quality through differences in the abnormal accruals, reporting lags, the likelihood of issuing an adverse audit opinion and higher audit fees (Khlif & Achek, 2017). Chung and Monroe (2001) report that female auditors deliver better quality compared to male auditors when tasks are more complex. Ittonen et al. (2013) find that abnormal accruals are lower under female audit partners, which implies less earnings management and therefore a higher audit quality. Sweeney et al. (2010) state that female auditors have a significant higher ethical evaluation compared to male auditors. Unethical behaviour resulted mostly in underreporting of time for female auditors and in premature sign-offs for male auditors. Premature sign-offs are seen as the most quality decreasing unethical behaviour by the authors, which also indicates better audit quality under female audit partners. These results are in line with the results of the study by You et al. (2011), who state that women tend to score higher on moral sensitivity measures than men, where moral sensitivity is defined as one's awareness of how one's actions affect others. This awareness is important in the so-called auditor paradox between the public interest and the audit company's commercial side (Jonnergård et al., 2010). Jonnergård et al. (2010) find that female auditors are less concerned about the commercial side of auditing compared to their male colleagues, therefore implying a higher audit quality under female auditors. Another measure of audit quality is the issuance of going concern opinion (Hardies et al., 2016). According to Hardies et al. (2016) female auditors tend to issue a going concern opinion sooner than male auditors, which indicates higher audit quality.

Hossain et al. (2018) find quite the opposite result, however. They find that female auditors are less likely to issue a going concern opinion for firms in financial distress compared to male auditors. The results of Gold et al. (2009) show that male auditors are more accurate than female auditors, which means the audit quality is higher under male audit partners. Near & Miceli (1985) state that women tend to conform more to a majority opinion than males through their research into whistleblowing. This is confirmed by the results of Miceli et al. (1991) where men are more likely to report wrongdoing compared to women. Ye et al. (2014) report that female auditors are correlated with greater audit failure compared to male auditors. Last but not least, there is also research that states that differences across gender cannot really be extended to the auditor population (Reheul et al., 2017).

Based on the majority of abovementioned research, audit quality under female engagement partners is likely to be higher. These results were found before the impact of Covid-19 however. In general, female employees were less satisfied with work during the pandemic (Collins et al., 2020; Feng & Savani, 2020; Lyttelton et al., 2020). Their work engagement was lower, since women were mostly homeschooling their children and took on other domestic responsibilities (Collins et al., 2020; Carli, 2020). Female employees were more exposed to stress, depressed feelings, and had less concentration compared to male employees (Rožman et al., 2021). During the pandemic the work efficiency of female employees was also more negatively impacted in comparison to male employees (Cui et al., 2021; Rožman et al., 2021; Yavorsky et al., 2022). This could all potentially lead to lower audit quality for female audit engagement partners in comparison to their male colleagues.

According to Hegazy et al. (2022) auditor gender did not significantly affect audit quality during the pandemic. This study included auditors on different job levels however, most of the interviewees being senior auditors. They are not accountable for the end result of the audit and hence the audit quality however; the audit engagement partner is. Also, the results were based on answers by the Egyptian auditors themselves, and one can question whether assessing their own work and audit quality is credible. Murphy et al. (2023) find no significant difference between male and female audit partners in audit quality with regards to Covid-19. This research was done in the UK however, on a small sample. The measures and course of the pandemic differs quite a lot from the US (Springford & Tilford, 2020), meaning the outcome cannot be translated to the US. On the one hand previous research before Covid-19 shows that female auditors are related to higher audit quality, but on the other hand research during Covid-19 shows that female employees in general are impacted more negatively by the pandemic compared to men. Since previous research cannot reliably predict the effect of Covid-19 on audit quality based on gender, the following null hypothesis is proposed:

H3: The negative impact of Covid-19 on audit quality is not different for female audit engagement partners compared to male audit engagement partners

3. Data and methodology

3.1 Model specification and variable construction

Following previous literature (Causholli et al., 2022; Gong et al., 2022), the following regression model is estimated to examine the impact of Covid-19 in general on audit quality:

$$AQ_{i,t} = \alpha + \beta_1 COVID + \gamma_i X + \varepsilon_{i,t} \quad (1)$$

Where $AQ_{i,t}$ is firm i 's audit quality in year t . Restatements of the 10-K statements (*RESTATE*) issued are used as a proxy for audit quality, since this is acknowledged as a reliable measure by both practitioners and academics (Aobdia, 2019). *RESTATE* equals 1 if a firm issued restatement(s) after filing the 10-K report and 0 otherwise. Since the dependent variable is a dummy variable, a logit regression model is used. *COVID* is a dummy variable that equals 1 if the filing date passes January 1st 2020, since that month Covid-19 was found in the US (Luo & Malsch, 2023). Based on the previously mentioned literature, the pandemic is likely to have a negative effect on audit quality. I therefore expect to see an increase in the number of restatements during Covid-19. X is a vector of control variables. I control for firm size (*SIZE* and *ATURN*), since audit quality is related to firm size (Eshleman & Guo, 2014). I also control for firm profitability (*ROA*, *CFO* and *LOSS*) since this provides incentives to manipulate financial reports when a profit or loss is encountered, which in turn affects audit quality (Causholli et al., 2022; Cohen et al., 2014; Gong et al., 2022). Financial health is included (*LEV* and *CURR*) to control for financial distress of the audited companies (Eshleman & Guo, 2014; Gong et al., 2022). Firms that experience sales growth likely encounter time discrepancies between book values and market values, therefore the market-to-book ratio (*MTB*) is included (Causholli et al., 2022; Gong et al., 2022). The issuance of stock or long-term debt (*ISS*) is included to control for external financing (Eshleman & Guo, 2014). Year- and industry fixed effects (*IND*) are also included (Causholli et al., 2022; Cohen et al., 2014; Eshleman & Guo, 2014). Table 1 (appendix) provides the definitions of all the variables. Figure 1 (appendix) provides an overview of the theoretical and practical constructs used through Libby boxes.

To test the association between audit quality and Big 4 firms during the pandemic, the following regression model is used:

$$AQ_{i,t} = \alpha + \beta_1 COVID + \beta_2 BIG4 + \beta_3 COVID * BIG4 + \gamma_i X + \varepsilon_{i,t} \quad (2)$$

Where *BIG4* is a dummy variable that equals one for Big 4 audit firms, and zero otherwise. Audit firms labelled as Big 4 are: Deloitte, EY, KPMG and PWC. The interaction term *COVID*BIG4* is included to test for the effect of Big 4 auditors on audit quality during the pandemic. The control variables remain unchanged.

To examine the possible change in audit quality due to audit engagement partner gender during the pandemic, the following regression model is used:

$$AQ_{i,t} = \alpha + \beta_1 COVID + \beta_2 FEMALE + \beta_3 COVID * FEMALE + \gamma_i X + \varepsilon_{i,t} \quad (3)$$

Where *FEMALE* is a dummy variable that equals one when the audit engagement partner is female, and 0 otherwise. The interaction term *COVID*FEMALE* is included to test for the effect of female auditors on audit quality during the pandemic. The control variables remain unchanged. In all regression models, all non-binary variables are winsorized.

3.2. Sample selection

In order to research the effect of Covid-19 on audit quality in the US, I first obtain the 10-K statements from the years 2018-2021 from WRDS Sec Filings. The years 2018-2019 being pre-Covid, and the years 2020-2021 during Covid. Each 10-K financial report consists of several database entries called sequences. In order to avoid double counting the same 10-K statements I filter out sequence 1 only, which is the 10-K report itself. Then the possible 10-K restatements of this reporting period are obtained from the same database and linked to the original 10-K statements. For each 10-K report filed, the audit firms are required to submit a Form AP; which is short for Auditor Reporting of Certain Audit Participants (PCAOB, 2021). A Form AP includes the audit engagement partner name and the name of the audit firm. These are combined with the 10-K dataset. The data is retrieved from the PCAOB database AuditorSearch, the complete database up to 24-11-2023 is downloaded. After deleting incomplete/incorrect data, missing CIK values and removing duplicates, the remainder is merged with the 10-K data using CIK and fiscal year. Next, I gather the gender data from Namsor or LinkedIn and match this with the audit engagement partner name. To finish the dataset, control variables are obtained from Compustat. Data entries with missing variables are removed and the remaining dataset is merged based on CIK and fiscal year. Last, the industry fixed effect is taken into account on a 2-digit basis, which means that data of industries with less than 10 observations were removed from the sample. The final sample consists of 9,514 observations. The sample selection process can be found in Table 2.

TABLE 2**Sample selection process**

10-K statements and restatements	(1)	(2)
All 10-K statements from 2018 - 2021		2,553,633
Less: Double counting of restatements by deleting sequences other than 1		<u>(2,525,809)</u>
All 10-K restatements of years 2018-2023	195,779	
Less: Double counting of restatements by deleting sequences other than 1	<u>(191,522)</u>	
Remaining 10-K restatement data	4,257	
Merged sample		<u><u>27,824</u></u>
Form AP disclosure		
Entire database from AuditorSearch at 24-11-2023	111,927	
Less: Incomplete/incorrect data	(1,317)	
Less: Data without a CIK	(717)	
Less: Duplicates of Form AP's	<u>(4,310)</u>	
Remaining Form AP disclosure data	105,583	
Less: observations lost due to matching		<u>(4,166)</u>
Merged sample		<u><u>23,658</u></u>
Gender		
Namsor and LinkedIn combined database	1,191	
Less: observations lost due to unclear gender		<u>(26)</u>
Merged sample		<u><u>23,632</u></u>
Control variables		
Control variables for fiscal years 2018 - 2021	42,929	
Less: observations with missing data for one of the control variables	<u>(24,125)</u>	
Remaining control variable data	18,804	
Less: observations lost due to matching		<u>(14,082)</u>
Less: observations lost due to industry fixed effects		<u>(36)</u>
Merged sample		<u><u>9,514</u></u>

Table 2 – Column (1) contains the number of sample observations when retrieving the data from its source. All adaptations to clean up this original dataset (before adding the data to the main dataset) are also stated in this column. Column (2) contains the number of observations of the main dataset, which eventually comes down to a number of 9,514 observations. The main dataset starts off with all 10-K statements from 2018-2021, after which the data of the other databases is added. The “merged sample” indicates the remaining number of observations after the addition of another database; e.g. 23,658 observations remain after matching the main dataset to the Form AP disclosure data.

4. Results

4.1. Data descriptives

Table 3 presents the data descriptives for the final sample. Panel A describes the full sample statistics, while panel B compares observations pre- and during Covid. Panel C shows the sample size per year. During the sample period 10.3% of the filed 10-K reports were restated. The sample is distributed fairly equal between the pre- and post-Covid period, as indicated by the mean of *COVID*. Around 55.8% of the filed 10-K reports were audited by a Big 4 audit company, while 19% of the total 10-K reports were audited by a female audit engagement partner. The average size of the audited companies is 2.797, which translates to an average total assets of 16 million dollars. The average leverage ratio is 0.644, suggesting that companies are not overly reliant on debt financing and have a reasonably strong financial position. Almost half of the sample firms experienced income loss during the sample period, and the average *CFO* was negative, indicating low operational sustainability. The average *ROA* is also slightly negative, meaning weak financial performance on average and lower shareholder returns. The average Market-to-Book ratio is -19.571, indicating that the market values the companies lower than its book value. The average of 0.595 for *ISS* shows that approximately 59.5% of the sample companies has engaged in capital raising activities during the sample period. The current ratio of the sample firms is 3.466, indicating the sample companies on average have ample liquidity to meet their short-term financial obligations.

In Panel B the data sample is split in two periods; pre- and during Covid. A t-test is performed to test whether firm characteristics are significantly different between these periods. During Covid-19 a slight non-significant increase in restatements is seen. The number of firms audited by Big 4 accounting firms remain relatively stable between the periods. The number of 10-K statements audited by female audit engagement partners slightly increased with a difference of 0.015, which is significant at a 10% level. Companies have grown slightly in size during the Covid-19 period, while their asset turnover decreased significantly at a 10% level during Covid-19. There is an increase in leverage during the Covid-19 period, indicating heavier reliance on debt financing. The number of firms experiencing a loss increased during Covid-19. The average *CFO* has decreased slightly, which indicates the sample companies are generating less cash from their assets on average. The average market-to-book ratio decreased, meaning on average the company's market valuation relative to their book value decreased during Covid-19. The *ROA* decreased by 0.061 on average, which means that the profitability relative to the assets decreased for the sample companies during Covid-19. The issuance of stocks or debt increased, indicating that companies needed more external financing during Covid-19. The current ratio increased by 1.370 which suggests that the sample companies' liquidity position was stronger during Covid-19. Overall, these results show that the samples do not differ that significantly across the pre-Covid period and during Covid-19. Only two variables were significantly different at a 10% level; significantly more female audit engagement partners were in charge of the audits during Covid-19 and the asset turnover of the sample companies was significantly lower during Covid-19. Panel C indicates the distribution of the sample size across the years; the observations are distributed quite evenly.

TABLE 3

Data descriptives

Panel A: Full sample descriptive statistics

Variable	N	Mean	SD	Min	Max
<i>RESTATE</i>	9,514	0.103	0.304	0	1
<i>COVID</i>	9,514	0.501	0.432	0	1
<i>BIG4</i>	9,514	0.558	0.497	0	1
<i>FEMALE</i>	9,514	0.190	0.393	0	1
<i>SIZE</i>	9,514	2.797	1.081	-2.097	5.559
<i>LEV</i>	9,514	0.644	0.966	0	60.962
<i>LOSS</i>	9,514	0.447	0.497	0	1
<i>CFO</i>	9,514	-0.033	0.385	-10.480	3.397
<i>MTB</i>	9,514	-19.571	2,877.195	-274,372.400	49,700.660
<i>ROA</i>	9,514	-0.155	0.846	-40.105	9.281
<i>ISS</i>	9,514	0.595	0.491	0	1
<i>ATURN</i>	9,514	0.758	0.712	0	19.735
<i>CURRENT</i>	9,514	3.466	77.220	0	7,544.833

Panel A – *RESTATE*, *COVID*, *BIG4*, *FEMALE*, *LOSS* and *ISS* are binary variables, therefore their value is a minimum of 0 and a maximum of 1. *RESTATE* is the dependent variable, whereas *COVID*, *BIG4* and *FEMALE* are the independent variables. The remaining variables are control variables.

Panel B: Descriptives based on period

Variable	<i>Pre-Covid</i>	<i>During Covid</i>	Difference
	Mean	Mean	
<i>RESTATE</i>	0.099	0.105	-0.005
<i>BIG4</i>	0.556	0.560	-0.004
<i>FEMALE</i>	0.181	0.196	-0.015*
<i>SIZE</i>	2.771	2.813	-0.042
<i>LEV</i>	0.618	0.660	-0.042
<i>LOSS</i>	0.397	0.477	-0.079
<i>CFO</i>	-0.012	-0.046	0.035
<i>MTB</i>	23.245	-45.742	68.987
<i>ROA</i>	-0.117	-0.179	0.061
<i>ISS</i>	0.550	0.623	-0.074
<i>ATURN</i>	0.856	0.698	0.158*
<i>CURRENT</i>	2.616	3.986	-1.370

Panel B – For the difference between the means the following accounts: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. A t-test on the means of the samples pre- and during Covid was performed to find whether firms across these samples differ significantly.

Panel C: Sample size per year

Year	Observations
2018	2,412
2019	2,356
2020	2,409
2021	2,337

Panel C – The years 2018 and 2019 are the pre-Covid period, whereas the years 2020 and 2021 are during Covid.

Table 4 presents Pearson’s correlation metrics of all variables used in the regressions. *RESTATE* is positively correlated to *COVID*, indicating that audit quality decreased during Covid-19. This correlation is not significant however. *BIG4* is significantly negatively correlated to *RESTATE*, which suggests that audit quality increases when the audit is performed by a Big 4 auditor.

Table 4
Pearson's correlation
table

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) <i>RESTATE</i>	1.000												
(2) <i>COVID</i>	0.010	1.000											
(3) <i>BIG4</i>	-0.107***	0.000	1.000										
(4) <i>FEMALE</i>	-0.038***	0.018*	0.020	1.00									
(5) <i>SIZE</i>	-0.153***	0.019	0.519***	0.069***	1.000								
(6) <i>LEVERAGE</i>	0.010	0.021	-0.044***	0.010	-0.131***	1.000							
(7) <i>LOSS</i>	0.136***	0.077***	-0.133***	-0.046***	-0.440***	0.082***	1.000						
(8) <i>CFO</i>	-0.096***	-0.044	0.182***	0.020	0.459***	-0.384***	-0.435***	1.000					
(9) <i>MTB</i>	0.00	-0.010	0.010	0.000	0.028***	-0.042***	-0.010	0.058***	1.000				
(10) <i>ROA</i>	-0.067***	-0.027	0.135***	0.010	0.318***	-0.378***	-0.321***	0.705***	0.043***	1.000			
(11) <i>ISS</i>	-0.034***	0.073***	0.121***	0.000	0.333***	0.063***	-0.112***	0.119***	0.010	0.061***	1.000		
(12) <i>ATURN</i>	0.010	-0.015*	-0.068***	0.026**	-0.080***	0.072***	-0.142***	0.166***	0.010	0.075***	-0.010	1.000	
(13) <i>CURR</i>	-0.000	0.010	-0.010	-0.010	-0.010	-0.010	-0.000	-0.000	0.000	0.000	-0.023**	-0.017*	1.000

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

FEMALE is significantly negatively correlated with *RESTATE*, which indicates that audit quality is higher under female audit engagement partners. This is in line with previous research. *FEMALE* is positively significantly correlated to *COVID* at a 10% level. During Covid-19 significantly more audit engagement partners were female compared to the pre-Covid period. During Covid-19 significantly more companies suffered a loss and more companies issued stock or debt at a 1% significance level. *BIG4* is positively correlated to *SIZE* at significant level of 1%, which is in line with previous findings that larger firms tend to choose one of the Big 4 auditors. Most of the control variables are significantly correlated with *BIG4* and their directions indicate that better performing firms tend to have Big 4 auditors. *FEMALE* is positively correlated to *SIZE*, suggesting that female audit engagement partners are more likely to audit bigger companies. *FEMALE* is negatively correlated to *LOSS*, which suggests that female audit engagement partners tend to audit firms that are less likely to endure negative income.

4.2 Covid-19 and audit quality

H1 is evaluated by estimating regression (1), and the results are presented in model (1), Table 5. The coefficient of our main interest is β_1 ; which is a positive value of 0.042. The direction of the coefficient suggests that the likelihood of a 10-K restatement is higher during Covid compared to pre-Covid. Since the value is not significant, the evidence is not strong enough to indicate lower audit quality during Covid-19. The coefficient for *BIG4* is -0.326, which is significant at a 1% level. If the variable *BIG4* takes the value of 1, the likelihood of a restatement decreases by 58%. This indicates that Big 4 auditors are associated with a lower likelihood of restatement in comparison to other firms. The significant negative coefficient of 0.267 for *SIZE* indicates a lower likelihood of restatements for larger companies, implying higher audit quality. This is in line with previous research. The negative, significant coefficient of 0.090 for leverage suggests that higher leveraged firms are less likely to issue restatements. This could be due to the more extensive and thorough audit performed because of the higher financial risk perception that higher leverage brings. The positive significant coefficient for *LOSS* indicates that companies reporting losses are more likely to issue restatements. The significant coefficient of *MTB* is approaching zero, meaning the market-to-book ratio does not influence the likelihood of restatement. The small negative, significant coefficient for *CURR* suggests that companies with a stronger liquidity position are less likely to issue restatements. The coefficients of *CFO*, *ROA*, *ISS* and *ATURN* are not significant.

In conclusion, the direction of H1, i.e. more restatements during Covid-19, is correct. Restatements being the measure of audit quality, audit quality declined due to Covid-19. H1 is rejected however, since the results are not significant. In conclusion, there is no significant difference in audit quality between the period pre- and during Covid.

4.3 Covid-19 and Big 4 auditors

H2 is evaluated by estimating regression (2), and these results are presented in model (2), Table 5. An interaction term *COVID*BIG4* is added to regression model (1). This term represents the change in the effect of Covid-19 on restatements when the firm is audited by a Big 4 auditor compared to a non-Big 4 auditor. The coefficient of this interaction term is -0.246, which is significant at a 10% level. This suggests that 10-K reports audited by Big 4 auditors are less likely to be restated during Covid-19 compared to non-Big 4 auditors.

TABLE 5

Main results: Covid-19 and audit quality, Covid-19 and Big 4 auditors

	Dependent variable: <i>RESTATE</i>	
	Model 1	Model 2
<i>COVID</i>	0.042 (0.074)	0.147 (0.097)
<i>BIG4</i>	-0.326*** (0.085)	-0.171 (0.123)
<i>COVID * BIG4</i>		-0.246* (0.145)
<i>SIZE</i>	-0.267*** (0.048)	-0.266*** (0.048)
<i>LEV</i>	-0.090** (0.037)	-0.090** (0.037)
<i>LOSS</i>	0.598*** (0.090)	0.604*** (0.090)
<i>CFO</i>	-0.158 (0.115)	-0.159 (0.116)
<i>MTB</i>	0.000** (0.000)	0.000** (0.000)
<i>ROA</i>	0.030 (0.042)	0.031 (0.043)
<i>ISS</i>	0.048 (0.076)	0.043 (0.076)
<i>ATURN</i>	0.050 (0.047)	0.053 (0.047)
<i>CURR</i>	-0.001* (0.000)	-0.001* (0.000)
Constant	-1.129*** (0.361)	-1.200*** (0.366)
Industry fixed effects included	Yes	Yes
Observations	9,514	9,514
R-squared	0.0621	0.0626

Table 5 – For the coefficients the following accounts when significant: *p<0.10, **p<0.05, ***p<0.01

This difference between Big 4 and non-Big 4 auditors is illustrated in Figure 2. For non-Big 4 auditors the number of restatements increased in times of Covid-19. For Big 4 auditors the number of restatements decreased during Covid-19 compared to pre-Covid. The overall number of restatements by Big 4 companies is lower during both periods compared to non-Big 4 auditors. The coefficient for *COVID* in model (2), as seen in Table 5, slightly increased compared to model (1). This coefficient captures the effect of Covid-19 for non-Big 4 firms; the value of 0.147 indeed shows that the number of restatements increased for non-Big 4 firms during the pandemic. This effect is not significant. The coefficient for *BIG4* increased to -0.171,

and is not significant anymore. This means that the effect of being audited by a Big 4 company in the period before Covid-19 is not significant.

Before Covid-19 there was no significant difference in audit quality between Big 4 and non-Big 4 auditors. The coefficients for the other variables in model (2) are roughly the same as in model (1), which is explained above.

Overall, the results of model (2) imply that more restatements were made during Covid-19 for non-Big 4 audited clients, indicating lower audit quality during Covid-19 compared to pre-Covid for non-Big 4 audit clients. This effect is not significant however. The clients of Big 4 auditors made significantly less restatements during Covid-19 compared to pre-Covid, meaning the audit quality improved during Covid-19 for Big 4 audited clients. This is in line with H2, and since the results are significant, H2 is not rejected.

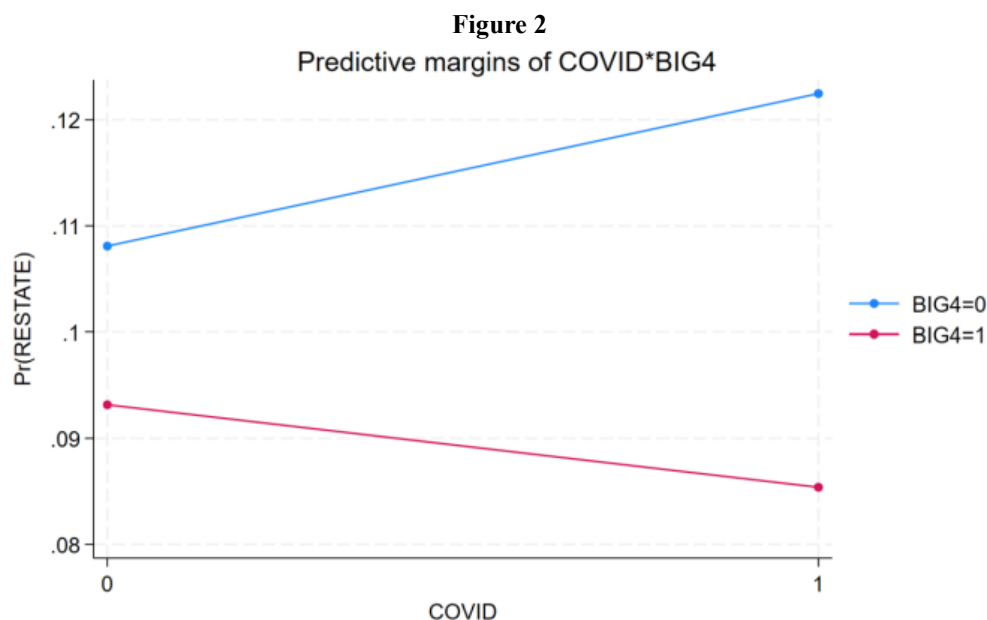


Figure 2 - This graph illustrates the outcome of H2 for the interaction term *COVID*BIG4*. It shows the difference between the number of restatements on the y-axis for Big 4 or non-Big 4 firms versus the time period on the x-axis.

4.4 Covid-19 and female audit engagement partners

H3 is evaluated by estimating regression (3), and the results are presented in model (1) and (2), Table 6. In model (1) the coefficient β_1 is 0.051, which suggests that the likelihood of a 10-K restatement is higher during Covid compared to pre-Covid. This is not significant, however. The coefficient for *FEMALE* is -0.235, which is significant at a 5% level. This means that if an audit is performed by a female audit engagement partner, the likelihood of a restatement is 55.8% less in comparison to a male auditor. The significant negative coefficient of 0.362 for *SIZE* indicates a lower likelihood of restatements for larger companies, implying higher audit quality. This is in line with previous research. The negative, significant coefficient of 0.100 for leverage suggests that higher leveraged firms are less likely to issue restatements. This could be due to the more extensive and thorough audit performed because of the higher financial risk perception that higher leverage brings. The positive significant coefficient for *LOSS* indicates

that companies reporting losses are more likely to issue restatements. The significant coefficient of *MTB* is approaching zero, meaning the market-to-book ratio does not influence the likelihood of restatement. The coefficients of *CFO*, *ROA*, *ISS*, *ATURN* and *CURR* are not significant.

TABLE 6

Main results: Covid-19 and female audit engagement partners

	Dependent variable: <i>RESTATE</i>	
	Model 1	Model 2
<i>COVID</i>	0.051 (0.074)	0.070 (0.079)
<i>FEMALE</i>	-0.235** (0.098)	-0.151 (0.162)
<i>COVID * FEMALE</i>		-0.130 (0.202)
<i>SIZE</i>	-0.362*** (0.042)	-0.362*** (0.042)
<i>LEV</i>	-0.100*** (0.038)	-0.100*** (0.038)
<i>LOSS</i>	0.563*** (0.089)	0.564*** (0.089)
<i>CFO</i>	-0.151 (0.114)	-0.151 (0.113)
<i>MTB</i>	0.000** (0.000)	0.000** (0.000)
<i>ROA</i>	0.025 (0.040)	0.024 (0.040)
<i>ISS</i>	0.060 (0.076)	0.061 (0.076)
<i>ATURN</i>	0.050 (0.047)	0.050 (0.046)
<i>CURR</i>	-0.001 (0.000)	-0.001 (0.000)
Constant	-1.006*** (0.361)	-1.022*** (0.362)
Industry fixed effects included	Yes	Yes
Observations	9,514	9,514
R squared	0.0609	0.0610

Table 6 – For the coefficients the following accounts when significant: *p<0.10, **p<0.05, ***p<0.01

An interaction term is added in model (2); *COVID*FEMALE*. The coefficient of this interaction term is -0.130, which indicates that female audit engagement partners issue less restatements during Covid-19 compared to male audit engagement partners. The interaction coefficient is not significant, however. In model (2) the coefficient of *COVID* is 0.070, indicating that in times of Covid the likelihood of restatement is slightly higher for male audit engagement partners. This coefficient is not significant. The coefficient of *FEMALE* is -0.151, which shows that

female audit engagement partners are less likely to issue restatements pre-Covid compared to their male colleagues, but this value is also not significant. Figure 3 clearly shows the overall picture; female auditors issue less restatements compared to male auditors. The number of restatements during Covid-19 became less for female-, but more for male audit engagement partners. These results are not significant however. The coefficients for the other variables in model (2) are roughly the same as in model (1), which is explained above.

To conclude; the effect that female audit engagement partners issue less 10-K restatements compared to their male colleagues during Covid-19 is found, but not significant. This means that the negative impact of Covid-19 on audit quality is not significantly different for female audit engagement partners compared to male audit engagement partners. H3 is not rejected.

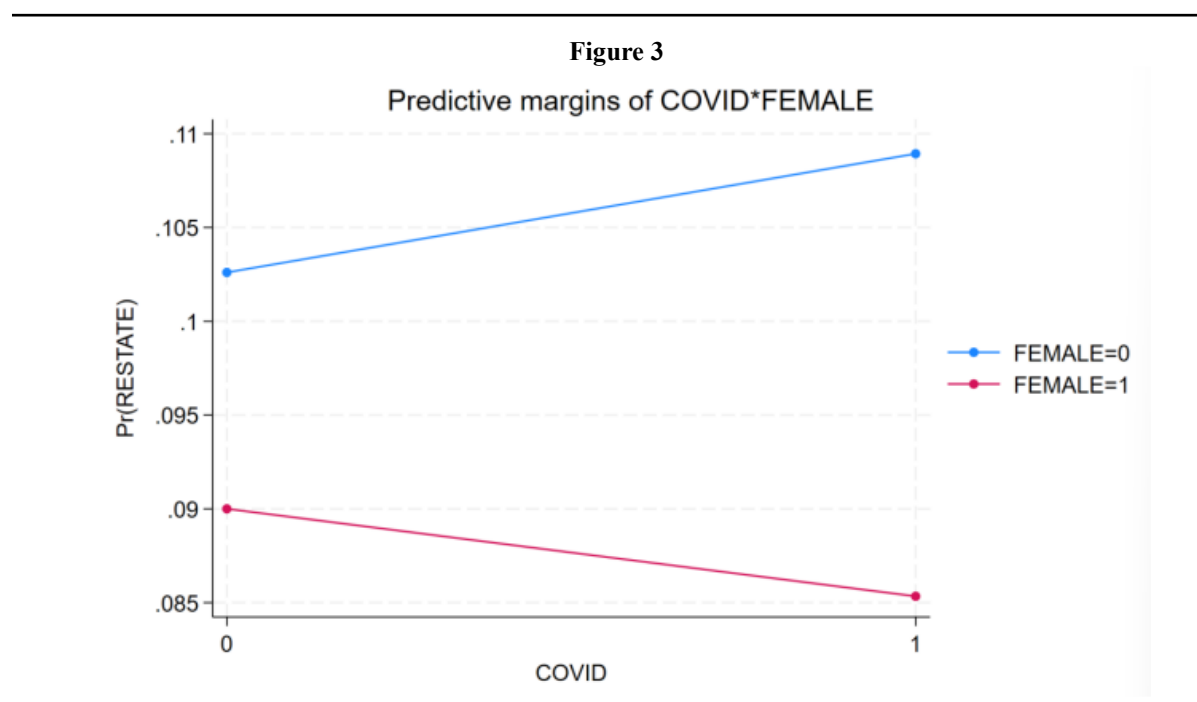


Figure 3 - This graph illustrates the outcome of H3, for the interaction term *COVID*FEMALE*. It shows the difference between the number of restatements on the y-axis for female or male audit engagement partners versus the time period on the x-axis.

4.5 Additional analysis

Following the results of hypothesis 2, audit quality is significantly higher during Covid-19 for firms audited by a Big 4 auditor compared to firms audited by a non-Big 4 auditor. This is in line with one of the earliest theories in audit literature, which finds that Big 4 auditors provide higher audit quality than other auditors (DeAngelo, 1981). There is a potential endogeneity problem however; Firms select their auditors and auditors decide if they accept a firm as their client. Investors regard the earnings of a company audited by a Big 4 auditor to be more trustworthy (Teoh & Wong, 1993), incentivizing better performing (and often larger) firms with many investors to choose a Big 4 auditor. At the same time audit firms tend to select the less risky clients with higher earnings quality (Eshleman & Guo, 2014).

TABLE 7

Additional analysis: Covid and Big 4

Panel A: Descriptives based on company size

Variable	<i>Smaller companies</i>	<i>Larger companies</i>	Difference
	Mean	Mean	
<i>RESTATE</i>	0,149	0,064	0,085***
<i>COVID</i>	0,616	0,624	-0,008
<i>BIG4</i>	0,314	0,764	-0,450***
<i>FEMALE</i>	0,162	0,214	-0,052***
<i>SIZE</i>	1,831	3,611	-1,780***
<i>LEV</i>	0,665	0,626	0,040**
<i>LOSS</i>	0,666	0,262	0,404***
<i>CFO</i>	-0,185	0,095	-0,279***
<i>MTB</i>	-45,641	2,390	-48,031
<i>ROA</i>	-0,368	0,024	-0,391***
<i>ISS</i>	0,437	0,729	-0,292***
<i>ATURN</i>	0,777	0,742	0,035**
<i>CURRENT</i>	5,186	2,018	3,168**

Panel A – For the difference between the means the following accounts: *p<0.10, **p<0.05, ***p<0.01. A t-test on the means of both samples was performed to find whether the two samples differ significantly.

Panel B: Covid and Big 4, larger companies

	Dependent variable:	
	<i>RESTATE</i>	
	Model 1	Model 2
<i>COVID</i>	-0.125 (0.124)	0.054 (0.246)
<i>BIG4</i>	-0.129 (0.136)	0.020 (0.224)
<i>COVID*BIG4</i>		-0.238 (0.282)
<i>SIZE</i>	-0.375*** (0.128)	-0.374*** (0.128)
<i>LEV</i>	0.074 (0.278)	0.072 (0.278)
<i>LOSS</i>	0.492*** (0.182)	0.495*** (0.182)
<i>CFO</i>	-2.204*** (0.807)	-2.215*** (0.806)
<i>MTB</i>	-0.001 (0.001)	-0.001 (0.001)
<i>ROA</i>	-0.573 (0.913)	-0.550 (0.911)
<i>ISS</i>	0.104 (0.143)	0.104 (0.142)
<i>ATURN</i>	-0.026 (0.153)	-0.022 (0.155)
<i>CURR</i>	-0.058 (0.049)	-0.058 (0.049)
<i>Constant</i>	-0.341 (0.871)	-0.459 (0.875)
Industry fixed effects included	Yes	Yes
Observations	5,057	5,057
R squared	0.0609	0.0612

Panel B – For the coefficients the following accounts when significant: *p<0.10, **p<0.05, ***p<0.01

In order to exclusively test the effect of the type of auditor on audit quality pre- and during Covid-19, I split the previous sample in two, based on the mean client company size. Company size is strongly correlated with firm performance; larger firms tend to be more successful (Liargovas & Skandalis, 2010). Through a t-test of the means of both sample groups I indeed establish that the firms in the larger firm sample group perform significantly better compared to the smaller firms, see Panel A of Table 7. The regression model of H2 is then used again using the sample containing larger firms only.

The results presented in Panel B of Table 7 show no significant effect on audit quality when being audited by a Big 4 auditor in times of Covid-19. Having a Big 4 auditor pre-or during Covid-19 also does not significantly increase audit quality. There is no difference in the audit quality between non-Big 4 auditors and Big 4 auditors during Covid-19. It seems that the previous result for the second hypothesis is indeed affected by the endogeneity problem; better performing firms seem to have a higher audit quality during Covid-19 regardless of the auditor. There are other methods of testing this endogeneity problem however, and although size is strongly correlated to firm performance this relation does not exist for every firm in this sample. To conclude, there is a possible endogeneity problem, which could potentially mean there is no significant change in audit quality for Big 4 auditors in times of Covid-19. Further research has to be done however, to find whether the effect of Big 4 auditors on audit quality during Covid-19 exists.

5. Conclusion

Since the start of Covid-19, audit quality has become more important than ever to all types of stakeholders. The pandemic majorly influenced the audit industry, the audit procedures performed and the auditors personally. The objective of this research is to find whether Covid-19 has impacted audit quality. I find that the audit quality in general has not declined due to Covid-19. When considering the type of audit firm, I find that Big 4 auditors provide higher audit quality during Covid-19 compared to pre-Covid. Audit quality improved during the pandemic for clients audited by Big 4 auditors. There is a possible endogeneity problem here however; better performing firms tend to choose Big 4 auditors and Big 4 auditors tend to accept better performing firms more easily as clients. When performing additional testing, I indeed find a possible endogeneity problem, which could potentially mean that Big 4 auditors do not provide higher audit quality during Covid-19. Last but not least the gender of the audit engagement partner in charge does not influence audit quality in times of Covid-19.

This research contributes to the existing literature on the effect of Covid-19 on audit quality in the US, by using a more extensive sample and sample period than previous research. It also contributes to the body of knowledge on audit quality per auditor type during Covid-19, especially by taking into account the endogeneity problem. Last but not least, this research is the first to provide evidence on the effect of the audit engagement partner gender on audit quality during Covid-19 in the US.

The key takeaway for stakeholders is that audit quality is not impacted by Covid-19. It seems that auditors have adapted to the new situation during the pandemic. This means that learning programs and adapted audit procedures by the auditors are working, and they should therefore be maintained in the future. Investors do not have to be more cautious when using the 10-K statements of the financial years during Covid, since the audit quality stayed the same. There is no need for regulators to implement more rules or give out advice in order to maintain high audit quality in times of crises like the pandemic.

There are some limitations to this research. First of all, I only measured audit quality by using 10-K restatements. This was supported by previous research, but nevertheless the accounting restatements arising from materially misstated financial statements are not attributable to the auditor only. By using restatements as a proxy, it is also not possible to tell anything about audit quality differences among firms that did not issue restatements. Secondly, this research does not address other aspects of audit quality, such as the accuracy of going concern opinions or the accuracy of estimates. Thirdly, the endogeneity problem could also be tested by using propensity score matching. This is potentially a more reliable way to test whether the Big 4 audit quality is higher during Covid-19. Also, the possible endogeneity problem might not be the only explanation for the lower audit quality by non-Big 4 auditors. Further research needs to be done to find whether this is indeed the cause. Further research should also be done on the effect of the auditor gender on audit quality in times of Covid-19; this research only uses audit engagement partners whereas the majority of the audit team consists of other job layers. The quality of work by females across these layers may actually have been affected by the pandemic.

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Appendix

FIGURE 1

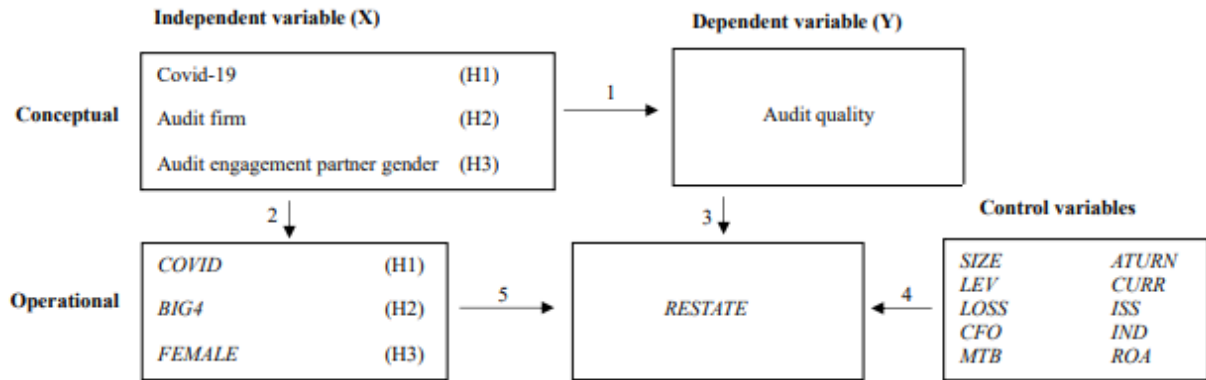


TABLE 1**Variable definitions**

<u>Variable</u>		<u>Definition</u>	<u>Source</u>
<u>Dependent variable</u>			
<i>RESTATE</i>	=	Dummy variable that equals one if a firm issues restatement(s) of financial statements, zero otherwise	WRDS
<u>Independent variables</u>			
<i>COVID</i>	=	Dummy variable that equals one if the filing date passes January 1st 2020, zero otherwise	Compustat
<i>BIG4</i>	=	Dummy variable that equals one for Big 4 audit firms and zero otherwise	PCAOB
<i>FEMALE</i>	=	Dummy variable that equals one when the audit engagement partner is female and zero otherwise	PCAOB Namsor LinkedIn
<u>Control variables</u>			
<i>ATURN</i>	=	Total sales (SALE)/lagged assets (AT)	Compustat
<i>CFO</i>	=	Cash flow from operations (OANCF)/beginning total assets (AT)	Compustat
<i>CURR</i>	=	Current assets (ACT)/current liabilities (LCT)	Compustat
<i>ISS</i>	=	Dummy variable that equals one if the cash flow from the sale of common and preferred stock (SCSTKC) or long term debt issuance is greater than zero, zero otherwise	Compustat
<i>LEV</i>	=	Total liabilities (LT)/ total assets (AT)	Compustat
<i>LOSS</i>	=	Dummy variable that equals one if income before extraordinary items (IB) is negative, otherwise zero	Compustat
<i>MTB</i>	=	Market value of equity (PRCC_F*CSHO) at fiscal year-end/ total stockholders' equity (SEQ)	Compustat
<i>ROA</i>	=	Earnings before extraordinary items (IB) / beginning total assets (AT)	Compustat
<i>SIZE</i>	=	Logarithm of total assets (AT)	Compustat
