

# **The Determinants of Audit Fees: Evidence from COVID-19**

**Ellen van den Heuvel**

**482778**

**Supervisor: Jaeyoon Yu**

**Second Assessor: Jihun Bae**

**Date Final Version: 12-7-2022**

**Abstract:** This study examines whether audit fees are affected by COVID-19. COVID-19 increased uncertainty for companies and created distortions in production, operation, and sales. These factors increased the work of auditors in terms of risk assessment and evidence gathering. Using a sample of US-listed companies, we find that there is no significant change in audit fees due to the outbreak of COVID-19. Looking at the determinants of audit fees, change in investment does not significantly affect audit fees. Change in revenue does have a significant effect on audit fees, but this effect is not significantly different during COVID-19. Looking at the difference between industries highly impacted by COVID-19 and industries less impacted by COVID-19, we find that there is no significant difference between these two groups in the effect of COVID-19 on audit fees.

**Keywords:** COVID-19, audit fees

The content of this thesis is the sole responsibility of the author and does not reflect the view of either the supervisor, second assessor, Erasmus School of Economics, or Erasmus University.

## 1. Introduction

On March 12, 2020, the World Health Organization (WHO) announced the COVID-19 outbreak to be a pandemic (World Health Organization, 2020). The COVID-19 pandemic has an effect on every aspect of human life as we know it. The huge impact of Covid-19 on daily life even raised the fear of Covid-19 causing an economic crisis and recession (National Library of Medicine, 2020). COVID-19 impacted the global economy by decreased availability of resources, production interruptions, interference in the operation of shopping malls and catering establishments, and a drop in tourism revenues (Deloitte, n.d.).

Due to the impact, COVID-19 has on the worldwide economy, there is also an effect of COVID-19 on financial reporting. The effect Covid-19 has on financial reporting will depend on the facts and circumstances, as well as the degree to which a company's daily business is affected by COVID-19 (KPMG, 2020). The effect of COVID-19 on financial reporting and the preparation of financial statements creates new challenges for auditors. Extra attention needs to be paid during the audit regarding topics such as valuation, the going concern opinion, additional disclosures, and changes to the companies' governance, systems, and processes. Besides this, the work of auditors will also face difficulties in not being able to be on-site, which could challenge assessing the reliability and appropriateness of audit evidence (AFM, 2020).

The additional challenges faced by auditors due to COVID-19 will lead to an increase in the scope and time of the audit process. This research examines the effect of COVID-19 on the audit fees of US firms and whether these effects differ across industries. The effect of COVID-19 on audit fees and the differences in effect among industries will help to evaluate the determinants of audit fees. The research can be summarized into the following research question:

*'What is the effect of COVID-19 on audit fees of US firms?'*

The COVID-19 pandemic only started two and a half years ago and the research on COVID-19 and its effects on economics and companies are still limited. Because of this, the evidence on the effect of COVID-19 on audit fees from the existing literature is rather small. Existing literature does show that COVID-19 strongly influenced all companies around the world. The influence of COVID-19 on companies can be divided into two main influences; increased uncertainty and distortions in production, operation, and sales. Increased uncertainty causes the management of a company to be more careful and to postpone investments. They choose to increase cash holding, which leads to a decrease in investment funds. Although most companies

are affected by COVID-19, there is a difference in impact between industries. Industries that are characterized by cross-border trade, social interaction, and personnel intensity are generally more impacted than other industries (Deloitte, n.d.; Shen et al., 2020). As COVID-19 influences companies, the financial statements of companies are also impacted by COVID-19. Financial statements are mainly impacted by COVID-19 in three ways; valuations, going concern opinion, and additional disclosures. As described, COVID-19 brings a lot of uncertainty for a company. This uncertainty influences the valuations for multiple balance sheet line items, as it is harder for companies to make accurate estimates. The going concern opinion regards the ability of a company to continue as a going concern, based on the available information for at least the coming 12 months. Since COVID-19 increases the uncertainty for the future, the assessment of the going concern opinion becomes more difficult and less accurate. Lastly, companies need to disclose the impact of COVID-19 in their financial statements, depending on how much they are affected by COVID-19 (AFM, 2020; KPMG, 2020). Just like other companies, audit firms are impacted by COVID-19, and experience changes in their daily operation of business. Due to COVID-19, auditors experience difficulties in the gathering of sufficient appropriate audit evidence. This may increase the time needed for the audit, as auditors need to find new ways to gather evidence. Besides that, new or intensified risks of material misstatement may arise because of uncertainty and unpredictability. Auditors need to revise the risk assessments that they made at the beginning of the audit and assess whether the valuation assumptions, chosen by management, are still appropriate in the context of COVID-19 (ACCA, n.d.; IAASB, 2020). Existing empirical literature identifies multiple determinants of audit fees. Two of the most common determinants of audit fees found in existing literature are client size and audit complexity (Al-Harshani, 2008; Anderson & Zéghal, 1994; Chan et al., 1993; Firth, 1997; Gerrard et al., 1994; Pong & Whittington, 2007; Thornton & Moore, 1993). Besides these common determinants of audit fees, some studies look into more specific determinants or events that influence audit fees. One of these events is the financial crisis of 2008. During the financial crisis the amount of risks increased, which caused audit fees to increase (Alexeyeva & Svanström, 2015; H. Chen et al., 2019; Xu et al., 2013). But there is also evidence that audit firms chose to cut audit fees, because of the financial distress their clients were in (Krishnan & Zhang, 2014). Although the COVID-19 crisis and the financial crisis of 2008 are not the same, their effects on the worldwide economy are comparable. Considering the outcomes of the studies on the financial crisis of 2008 on audit fees and the comparable

situation during COVID-19, this study predicts that COVID-19 has an effect on audit fees. Besides the general effect on audit fees, this study predicts that the effect of COVID-19 on audit fees differs between highly impacted industries and less impacted industries.

To empirically test the predictions that are made based on existing literature, financial data and data on audit fees is collected from the Compustat and Audit Analytics database. Both databases cover most public firms in the U.S. The sample consists of 967 firm-year observations over the years 2018, 2019, and 2020. To test the effect of COVID-19 on audit fees, three linear regression models are used. The first two models consist of a period variable indicating the period before COVID-19 and during COVID-19, and consist of two financial variables, revenue and investments, intended to measure the change in audit fees. We predict that COVID-19 caused an increase in audit fees. The first two models indicate that there is no significant relationship between audit fees and COVID-19, in other words, audit fees did not change significantly due to COVID-19. Besides that, we predict that a change in audit fees would be more pronounced for companies experiencing a decrease in revenue or in investments. We find that there is no significant change in audit fees due to a decrease in revenue or in investments during COVID-19. We do find that there is a significant relationship between change in revenue and audit fees. A decrease in change in revenue leads to an increase in audit fees. The third linear regression model consists of the same period variable as the first two models. Besides that, a treatment variable is added to indicate whether a company was highly impacted by COVID-19 or not. We predict that the effect of COVID-19 on audit fees is stronger for highly impacted industries. The third model indicates that there is no significant relationship between audit fees and industries who are highly impacted by COVID-19. Put differently, we cannot say that there is a significant difference in the effect of COVID-19 on audit fees between industries highly impacted by COVID-19 and industries less impacted. To gain more insight on the effect of COVID-19 on revenue, an additional analysis is performed. This analysis uses linear regression to estimate the change in revenue due to COVID-19. We find that change in revenue significantly decreased during COVID-19 and that there is a significant difference in the effect of COVID-19 on change in revenue between industries highly impacted by COVID-19 and industries less impacted by COVID-19.

This study contributes to the literature on COVID-19 and the literature on determinants of audit fees. Since COVID-19 is a very recent event, research on the effect of COVID-19 is limited, especially regarding COVID-19 and audit fees. This study provides a first insight into the

relationship between COVID-19 and audit fees and can act as a basis for further research. The literature on determinants of audit fees is already extensive. This study contributes to this literature by identifying a determinant of audit fees that less commonly named in audit fee literature.

This study suffers various limitations. Firstly, the sample consists of a very broad range of companies, which can influence the results. Secondly, the classification of industries into industries highly impacted by COVID-19 and industries less impacted are made on certain characteristics. We are not sure whether these characteristics all cause the same effects on an industry. There might be industries that are classified as highly impacted based on these characteristics, but are not highly impacted, and vice versa. Third, there is a lack of existing literature on this topic. Because of this, hypotheses are mainly based on the existing literature on the financial crisis of 2008 and audit fees. There is a chance that the effect of the financial crisis on audit fees and the effect of COVID-19 on audit fees are different.

As described, this study can serve as a basis for further research. Suggestions for further research are the use of more specific samples, where firm characteristics are more alike. Besides that, further research can also investigate the effect of COVID-19 on audit fees using different measures of audit risk and audit complexity.

## **2. Literature Review and Hypothesis Development**

### **2.1. COVID-19**

At the start of 2020, the world was shocked by the COVID-19 virus, which quickly spread throughout the world and became a pandemic. The COVID-19 pandemic (from now on: COVID-19) is being referred to as a ‘black swan event’, which is an unforeseeable or unpredictable crisis that often has extreme consequences (Nicola et al., 2020). The effects of COVID-19 are often compared with the economic effects of World War Two and the global financial crisis of 2008 (Nicola et al., 2020; Sharif et al., 2020). Although the effects of the global financial crisis of 2008 and COVID-19 seem comparable, their source has an important difference. The global financial crisis of 2008 was mainly caused by disruptions in the supply of capital. COVID-19 caused disruptions on both the supply and demand sides. Troubles in supplies of manufacturing goods, like auto parts and electronic components, caused distortions in supply chains all around the world. At the same time, the quarantining of people caused distortions in consumption, which was mostly felt in the traveling sector, the retail sector, and the hospitality sector (Deloitte, 2020).

## ***2.2. Effects of COVID-19 on (the performance of) companies and companies' financial statements***

The COVID-19 virus originated in China, with China taking action by putting the country into a lockdown. This lockdown significantly reduced the manufacturing of goods (Nicola et al., 2020). The lockdown in China did not only influence the Chinese market but also hugely impacted many industries worldwide dependent on products from China (Deloitte, n.d.). Even though China went into a strict lockdown, the COVID-19 virus quickly spread throughout the rest of the world, with the COVID-19 virus becoming a pandemic. All around the world governments took rigorous steps to avoid or delay the spread of COVID-19. These actions significantly impacted companies and created new challenges for these impacted companies (KPMG, 2020).

Although the performance of companies is influenced by COVID-19 in many different ways, the influence of COVID-19 on company performance can be divided into two main influences; COVID-19 causes uncertainty and COVID-19 harms the production, operation, and sales of a company, as it interrupts production and operation, and decreases sales. The first influence, COVID-19 causes uncertainty, has to do with the fact that uncertainty impacts the investment decision of managers. According to the real options theory, managers choose to postpone investments because of uncertainties. This is because, during times of uncertainty, managers choose to increase their cash holdings, which leads to a decrease in investment funds. Due to the decrease in investments, managers may miss profitable projects, which influences the revenue of a company, and in the long run the performance of a company (Shen et al., 2020). The second influence, COVID-19 harms the production, operation, and sales of a company, is mainly caused by the lockdowns implemented by governments in most countries around the world. As mentioned before, governments tried to decrease the spread of the COVID-19 virus by putting their country into a lockdown. Besides that, governments also imposed restrictions on the import of products from countries with high infection rates (Shen et al., 2020). The lockdown and import restrictions caused a significant impact on global supply chains, causing production and operation problems for companies all around the world (Deloitte, n.d.). The lockdown also significantly impacted the consumption of people. A survey of the World Bank (2021) shows that, for companies all around the world, one-fourth of companies experienced a sales fall of 50%, and that sales dropped by 27% on average. Sectors that are most impacted by COVID-19 are sectors that depend on parts or products from affected countries or sectors that depend on tourism (Deloitte, n.d.). Although it

seems like almost all companies and sectors experienced difficulties and decreased company performance due to COVID-19, some companies benefitted from COVID-19. COVID-19 created a shift from people working on-site to people starting to work from home. In the period between October 2020 and January 2021, 34% of firms increased their use of the internet, digital platforms, and social media. Besides that, 17% of firms invested in new equipment, software, and digital solutions. At times when most companies saw a decrease in demand and sales, technology companies saw an increase in demand for online working and communication (The World Bank, 2021). The effect of COVID-19 on companies can even be made more clear by looking at one of the most impacted industries in the US; the aviation industry. During the last couple of years, the aviation industry has experienced steady growth. The aviation industry plays a crucial role in the tourism sector as well as the transportation sector. Existing evidence shows that the aviation industry is at risk of pressures such as economic crises, political uncertainty, natural disasters, and pandemics. The COVID-19 pandemic challenged the aviation industry due to border closures and other restrictive measures to decrease the spread of COVID-19. In February 2020 the highest number of tracked flights per day was 109,400 flights. This dropped to around 40,000 flights per day after the WHO declared the COVID-19 virus to be a pandemic in March 2020. The rapid decrease in flights caused a significant decline in airline share prices and troubled the liquidity of airline companies. Due to the significant decline in share prices, the aviation industry experienced severe financial losses, including losses on investments. To survive and overcome the great financial losses due to COVID-19, aviation companies were in need of monetary and fiscal support (Dube et al., 2021).

The effect of COVID-19 on financial statements can be divided into three categories; valuations, going concern opinion, and additional disclosures. During the preparation of the financial statements, companies have to make estimations and assumptions about the valuation of multiple balance sheet line items. For example, for property, plant, and equipment, companies are required to examine the residual value and the useful life of the asset at the financial year-end. Due to COVID-19, it might be harder for companies to examine these estimates since COVID-19 brings a lot of uncertainties. Another example is the inventory. For the valuation of inventories, companies are required to measure inventory at the lower cost or net realizable value, due to delivery uncertainties because of COVID-19, it may be harder to estimate these values. Regarding the going concern opinion, a company needs to take into account all available information for at

least the coming 12 months, and whether any things cause material uncertainty about the company's ability to continue as a going concern. COVID-19 causes very uncertain and constantly changing circumstances, which makes it hard for a company to have a clear view of the coming 12 months. Lastly, companies need to offer additional disclosure on the impact of the COVID-19 pandemic in their financial statements. The number of additional disclosures will depend on the type of company and how much the company is affected by COVID-19 (AFM, 2020; KPMG, 2020).

### ***2.3. The effect of COVID-19 on the audit of financial statements***

Just like other companies, audit firms are impacted by COVID-19 and are facing new challenges in performing their audits. The challenges for auditors can be divided into three main challenges; uncertainty and unpredictability may cause new or intensified risks of material misstatement, problems in the gathering of sufficient appropriate audit evidence, and auditing new transactions such as the receipt of subsidies (IAASB, 2020). A survey of the Association of Chartered Certified Accountants (ACCA) (n.d.), shows that 27% of respondents saw an increased audit risk relating to the valuation of assets and completeness of liabilities. Companies are making estimates under more difficult conditions, with larger estimation uncertainties, which causes an increased risk of material misstatements in the valuation of both assets and liabilities (AFM, 2020). Auditors need to react to this by revising the risk assessments that they already made. Regarding the risk of a material misstatement because of accounting estimates, auditors need to put focus on changes to regulatory factors because of COVID-19 and assess whether the chosen assumptions are appropriate in the context of COVID-19 (IAASB, 2020). Restrictions implemented by governments also included working from home, which caused auditors not being able to visit audited entities to gather audit evidence. The auditor's report will be impacted when auditors are not able to gather sufficient appropriate audit evidence, because of this, audits may take more time (AFM, 2020). In the case of inventory counts, which is one of the most important on-site evidence-gathering procedures, auditors can make use of technology to virtually count the inventory. This can for example be done by using drone technology or counting the inventory through video calls. In both cases, the risks of these new procedures must be assessed (ACCA, n.d.). To help companies that are affected by COVID-19 and are experiencing financial troubles, governments implemented subsidy programs to support these companies. Auditors need to take into account the revenues from these subsidies, which increases the length of the audit (IAASB, 2020).



As mentioned before, the impact of COVID-19 differs between sectors and companies. Sectors that are most impacted by COVID-19 are the tourism sector, the manufacturing sector, the oil, gas, mining, and metals sectors, and the export sector. Given that companies in these sectors are mostly affected by COVID-19, it follows that the audit of these companies will face more new challenges and more revision of risk assessment, compared to companies in sectors that are less affected by COVID-19 (Deloitte, n.d.)

#### **2.4. Hypothesis development**

Previous empirical literature shows that there are several determinants for audit fees. One of the important determinants that is often identified in existing literature is the size of the audited client (Al-Harshani, 2008; Anderson & Zéghal, 1994; Chan et al., 1993; Firth, 1997; Gerrard et al., 1994; Pong & Whittington, 2007; Thornton & Moore, 1993). Besides client size, audit complexity is also identified in previous research as a factor that influences the amount of audit fees. Audit complexity is harder to measure and less straightforward than client size. A commonly used measure is the number of subsidiaries of the client (Anderson & Zéghal, 1994; Gerrard et al., 1994; Pong & Whittington, 2007; Thornton & Moore, 1993). But there are also examples of other measures of audit complexity, such as the research of Al-Harshani (2008), who uses the liquidity ratio of the client as an indicator for audit complexity. Another factor that is usually taken into account in audit fee research, is whether the client is audited by a Big 4 (or Big 8 in older research) firm. Francis (1984), Chan, Ezzamel, and Gwilliam (1993), as well as, Gonthier-Besacier and Schatt (2007), argue that audit fees charged to clients audited by a Big 4 (or Big 8) firm are higher. There are also researches that look into more specific things that influence audit fees. An example of this is the research of Ittonen and Peni (2012), who examine the effect of the audit engagement partner's gender on audit fees using a sample of companies in Denmark, Finland, and Sweden. They argue that female audit partners have significantly higher audit fees compared to male audit partners. Gosh and Pawlewicz (2009) examine the change in audit fees around a specific event, the implementation of the Sarbanes-Oxley Act (SOX). They find that after the implementation of SOX, audit fees increased significantly. This increase is even larger for companies audited by a Big 4 firm.

Another event that influenced audit fees and that has been frequently examined in previous literature is the financial crisis of 2008. During the financial crisis of 2008 auditors were faced with an increased amount of risks. To address and mitigate these risks, auditors had to increase

their labor hours and apply more extensive audit procedures (H. Chen et al., 2019). The increase in audit effort due to the increased risks led to an increase in audit fees, which is shown in existing literature. Xu, Carson, Fargher, and Jiang (2013) examine the effect of the financial crisis of 2008 on auditor behavior in Australia. They find that audit fees increase during the period 2008-2009, compared to the period 2005-2007. Alexeyeva and Svanström (2015) conduct the same kind of research but focus on a sample of Swedish companies. They argue that auditors increased audit fees during the period of the financial crisis of 2008, as well as after the period of the financial crisis of 2008. Contrary to these two studies, there are also studies that show a different relationship between audit fees and the financial crisis of 2008. They argue that audit firms were expected to cut audit fees, as a way to ‘share’ the economic pain caused by the financial crisis of 2008 (Chen, 2018). Krishnan and Zhang (2014) examined US companies in the financial sector and reveal that these companies were able to negotiate lower audit fees during the financial crisis of 2008.

As described, the financial crisis of 2008 and the COVID-19 crisis are not the same, but their effects on the worldwide economy are comparable. During COVID-19 companies experienced a lot of uncertainty and risks of material misstatement increased. Based on the effects of the financial crisis of 2008 on audit fees and the comparable situation of the financial crisis of 2008 and COVID-19, we expect that audit fees have changed because of COVID-19. Although the evidence on the effect of the financial crisis of 2008 on audit fees is mixed. We expect that auditors react to the increased audit risks and complexity by increasing audit fees. This prediction leads to the following hypothesis:

**H1:** *Audit fees have increased during COVID-19*

Although COVID-19 impacted almost all industries and companies across the world, some industries are more affected by COVID-19 than other companies. Recent research by Shen, Fu, Pan, Yu, and Chen (2020) investigates the impact of COVID-19 on firm performance. They divide their sample into industries that are highly impacted by COVID-19 and industries which are less impacted by COVID-19. The highly impacted industries are characterized by personnel intensity, cross-border trade, and social interaction. They find that for the highly impacted industries there is a significant decline in corporate performance, compared to the less impacted industries. This result supports the belief that the impact of COVID-19 differs among industries. Based on the difference in the impact of COVID-19 on industries, we expect that the effect of COVID-19 on audit fees differs as well. This prediction leads to the following hypothesis:

**H2:** *The effect of COVID-19 on audit fees is stronger for highly impacted industries*

### **3. Sample selection and Research design**

#### **3.1. Measuring the effect of COVID-19**

The effect of COVID-19 on audit fees is examined using the increased audit complexity and increased audit risk. Audit complexity is measured by the change in revenue, assuming that a decrease in change of revenue indicates a more complex audit. For the measurement of audit risks, the approach of Shen, Fu, Pan, Yu, and Chen (2020) is used, who measure uncertainty as the change in investments. A decrease in investments indicates a situation with increased uncertainty, we assume that increased uncertainty leads to higher audit risks.

#### **3.2. Sample Selection**

The sample selection procedure for this research is outlined in Table 2. The initial sample is derived using an intersection of *Compustat* and *Audit Analytics* and consists of 7,200 observations divided over three years; 2018, 2019, and 2020. Companies that miss observation(s) for one or more of the three subsequent years are excluded from the sample, which results in a sample of 1,842 firm-year observations. Further excluded are 170 firm-year observations with a fiscal year-end that does not end on the 31<sup>st</sup> of December. After that, 650 firm-year observations of companies in financial services industries (SIC codes 6000-6999) are deleted. Finally, 9 firm-year observations are removed due to missing values for audit fees. The final dataset consists of 967 firm-year observations regarding the audit fees of US companies.

#### **3.3. Research Design**

To test the first hypothesis, which investigates the effect of COVID-19 on audit fees, the following regression models are estimated, following the research of Shen, Fu, Pan, Yu and Chen (2020):

$$\begin{aligned} \text{AuditFees} = & \beta_0 + \beta_1 \text{RevChange} * \text{Period} + \beta_2 \text{RevChange} + \beta_3 \text{Period} + \beta_4 \text{Size} \\ & + \beta_5 \text{Leverage} + \beta_6 \text{Big4} + \varepsilon \end{aligned} \tag{1}$$

$$\begin{aligned} \text{AuditFees} = & \beta_0 + \beta_1 \text{InChange} * \text{Period} + \beta_2 \text{InvChange} + \beta_3 \text{Period} + \beta_4 \text{Size} \\ & + \beta_5 \text{Leverage} + \beta_6 \text{Big4} + \varepsilon \end{aligned} \tag{2}$$

where the dependent variable, *AuditFees*, are the audit fees paid by the company to the auditor. *RevChange* and *InvChange* are moderating variables that are intended to measure the impact of COVID-19. We assume that a decrease in *RevChange* indicates that the company is negatively influenced by COVID-19, leading to a more complex audit. A decrease in *InvChange* indicates that a company invested less due to increased uncertainty, leading to higher audit risks. *Period* is a dummy variable of the COVID-19 outbreak point. Regarding the financial statements ending on the 31<sup>st</sup> of December 2019, the effects of COVID-19 on the financial reporting are generally non-adjusting events (KPMG, 2020). Because of this, the fiscal year 2019 is classified as the pre-outbreak period, together with the fiscal year 2018. The outbreak period consists of the fiscal year 2020. The main variables of focus for the first hypothesis are *Period*, *RevChange\*Period*, and *InvChange\*Period*. If the coefficient ( $\beta_3$ ) for *Period* is positive, it means that audit fees increased during COVID-19. Negative coefficients for *RevChange\*Period* ( $\beta_1$  in model (1)) and *InvChange\*Period* ( $\beta_1$  in model (2)) mean that the effect of COVID-19 on audit fees can be partly explained by an increase in audit complexity and audit risks.

To test the second hypothesis, which explores the differences in the effect of COVID-19 on audit fees, between high impacted industries and low impacted industries, the following Difference-in-Difference (DID) model is estimated:

$$\begin{aligned}
 \text{AuditFees} = & \beta_0 + \beta_1 \text{Treated} * \text{Period} + \beta_2 \text{Treated} + \beta_3 \text{Period} + \beta_4 \text{Size} \\
 & + \beta_5 \text{Leverage} + \beta_6 \text{Big4} + \varepsilon
 \end{aligned}
 \tag{3}$$

where the dependent variable, *AuditFees*, are the audit fees paid by the company to the auditor. *Period* is a dummy variable of the COVID-19 outbreak point. Regarding the financial statements ending on the 31<sup>st</sup> of December 2019, the effects of COVID-19 on the financial reporting are generally non-adjusting events (KPMG, 2020). Because of this, the fiscal year 2019 is classified as the pre-outbreak period, together with the fiscal year 2018. The outbreak period consists of the fiscal year 2020. *Treated* is a dummy variable indicating whether a company is in a highly impacted industry or not. Industries that are most impacted by COVID-19 are characterized by cross-border trade, social interaction, and personnel intensity. Based on this, service industries, manufacturing industries, transportation industries, retailing industries, and utility industries are identified as highly impacted industries (McKinsey & Company, 2022; S&P Global, 2022). The classification of the *Treated* variable is made based on the Global Industry Classification Standard

(GICS) code. Companies with GICS codes; 1010, 2020, 2030, 2510, 2530, 2550, and 5510, are classified as highly impacted by COVID-19. All other companies are classified as less impacted by COVID-19. The main variable of focus for the second hypothesis is *Treated\*Period*. A positive coefficient ( $\beta_1$ ) for this variable indicates that the effect of COVID-19 on audit fees is more pronounced for companies that are highly impacted by COVID-19, than for companies that are less impacted by COVID-19.

Following prior research, control variables are added to control for several factors that may influence audit fees. *Size* is an indicator variable that measures the size of the company in terms of total assets. *Leverage* is an indicator variable that measures the amount of debt a company uses to finance its assets, in terms of total liabilities divided by total assets. *Big4* is an indicator variable equal to one if the financial statements of the company are audited by a Big 4 company, and zero otherwise.

## **4. Empirical Results**

### **4.1. Descriptive information**

Table 3 present the change in audit fees over the years 2018, 2019, and 2020. This table gives a first insight into the relationship between audit fees and COVID-19. It shows that over the years 2018-2020 the increase in audit fees declined, but audit fees did not decrease. Besides that, it shows that the decline in increase in audit fees is a bit steeper for industries that are highly impacted by COVID-19 than for industries less impacted by COVID-19. But this difference is very small, so based on this first insight it is hard to say whether there are significant differences between the industries highly impacted by COVID-19 and industries less impacted. Table 4 shows the descriptive statistics for the dependent, independent, and control variables. The dependent variable, *AuditFees*, varies from small values of audit fees (\$13,000) to larger values of audit fees (\$92,200,000) and has a mean value of 3,737. The independent variables, *RevChange* and *InvChange*, have a mean value of 0.056 and 0.096, respectively. This means that for the companies in the sample revenue increases by 5.6% on average over the years 2018-2020. The change in revenue per year is 11.79%, 6.43%, and 0.49% for the years 2017-2018, 2018-2019, and 2019-2020, respectively. The change in revenue per year shows that the increase in revenue declined. For companies in the sample, investment increased by 9.6% on average over the years 2018-2020. The investment change per year is 9.60%, 9.83%, and 9.30% for the years 2017-2018, 2018-2019,

and 2019-2020, respectively. Indicating that the investment change over the years 2018-2020 is constant over the full sample. The control variable *Size* shows that the sample consists of small companies with total assets of \$45,000 to large companies with total assets of \$511,669,000,000. *Leverage* has a mean value of 1.211, indicating that on average companies in the sample are financed with more debt than equity. *Big4* has a mean value of 0.810, this indicates that around 81% of the firms in the sample are audited by a Big 4 company. Table 5 shows the correlation matrix for the dependent, independent, and control variables. The correlation between the independent variables and control variables is <0.2 for almost all variables, implying that multicollinearity does not appear to be an important concern.

## 4.2. Regression results

### 4.2.1. COVID-19 and audit fees analysis

Table 6 reports the regression results of audit fee analyses. This table consists of three models; the baseline model measures the general effect of COVID-19 on audit fees, models 1 and 2 measure the effect of COVID-19 on audit fees through two determinants of audit fees: complexity and risk (measured by change in revenue and change in investment).

In the baseline model, the coefficient on *Period* is negative but insignificant, suggesting that there is no significant association between COVID-19 and audit fees. In model 1 as well as model 2, the coefficient on *Period* is negative but insignificant, also suggesting there is no significant association between COVID-19 and audit fees. Based on existing literature we predicted that audit fees would have increased during COVID-19, these results are not in line with our predictions. The coefficient on *RevChange*, in model 1, is negative and significant at  $p < 0.10$ , suggesting that a negative change in revenue leads to higher audit fees. This result is in line with the predictions made based on existing literature. We predicted that a decrease in revenue would indicate a more complex audit process resulting in higher audit fees. The interaction coefficient on *Period* and *RevChange* is negative but insignificant, suggesting that a change in revenue during COVID-19 does not significantly affect audit fees. We predicted that the effect of change in revenue would be more pronounced during COVID-19, as we expected that COVID-19 increased audit complexity. These predictions are not in line with the results of the regression analysis of model 1. In model 2, the coefficient on *InvChange* is negative but insignificant, this suggests that there is no significant relationship between change in investment and audit fees. Besides that, the interaction coefficient on *Period* and *InvChange* is positive but insignificant, indicating that there is no significant

evidence that the change in investment was higher or lower during COVID-19. Based on existing literature we expected that investment change is an indicator of audit risks and that audit risk increased during COVID-19. We cannot say whether our predictions are true based on the results of the regression analysis.

Based on the regression analyses of the baseline model and models 1 and 2, we do not have enough evidence to reject the null hypothesis of H1: ‘Audit fees increased due to COVID-19’. In other words, there was no significant change in audit fees due to COVID-19 in our sample.

#### **4.2.2. COVID-19 and audit fees differences between industries analysis**

Table 7 reports the regression results of audit fee analyses based on industry differences. This table consists of one model which includes the *Treated* variable to divide the sample into industries highly impacted by COVID-19 and industries less impacted by COVID-19.

The coefficient on *Period* is negative but insignificant, suggesting that there is no significant association between audit fees and COVID-19. This result is in line with the results of the regression of models 1 and 2, but not in line with the predictions made based on existing literature. The coefficient on *Treated* is negative and significant at  $p < 0.01$ , this suggests that on average audit fees are lower for industries that are classified as high impacted industries. The interaction coefficient on *Period* and *Treated* is negative but insignificant, suggesting that there is no significant effect of COVID-19 on audit fees for industries that are highly impacted by COVID-19. These results are not in line with the predictions made based on existing literature. We predicted that the effect of COVID-19 would be more pronounced for industries that are highly impacted by COVID-19, compared to less impacted industries.

Based on the regression analysis in model 3, we do not have enough evidence to reject the null hypothesis of H2: ‘*The effect of COVID-19 on audit fees is stronger for highly impacted industries*’. Put differently, there is no significant difference in the effect of COVID-19 on audit fees between industries highly impacted by COVID-19 and industries less impacted by COVID-19 in our sample.

#### **4.3. Additional Analysis**

The results of the regression analysis from model 1 suggest that a negative change in revenue leads to higher audit fees. But the results also suggested that COVID-19 did not significantly influence this effect. To further explore the relationship between change in revenue and COVID-19, we perform an additional regression analysis with *RevChange* as dependent variable and

*Period* as independent variable. Besides that, we also perform a regression analysis including *Treated*, to investigate the differences in change of revenue during COVID-19 between highly impacted industries and industries less impacted by COVID-19.

Panel A in Table 8 displays the average change in revenue over the years 2018-2020. More than half of the industries experience a drop in revenue increase or even a decrease in revenue. Of the seven industries classified as highly impacted, five industries experienced a decrease in revenue and two industries experienced a drop in revenue increase. Panel B reports the regression results of the models with *RevChange* as dependent variable. The coefficient on *Period* in model 4, is negative and significant at  $p < 0.01$ , this suggests that on average companies experienced a drop in increase in revenue or a decrease in revenue due to COVID-19. The coefficient on *Period* in model 5, is negative and significant at  $p < 0.01$ , suggesting the same result. The interaction coefficient on *Period* and *Treated* in model 5, is negative and significant at  $p < 0.05$ , this suggests that the effect of COVID-19 on change in revenue is stronger for industries that are highly impacted by COVID-19. In other words, the drop in increase of revenue or decrease in revenue due to COVID-19 is higher for industries that are highly impacted by COVID-19.

Given that audit fees increase if there is a decrease in change in revenue (result model 1) and that change in revenue decreased during COVID-19 (result model 4 & 5), we would expect that COVID-19 did have an effect on audit fees. This raises the concern that the regression analyses of models 1, 2, and 3 are missing variables that explain a decrease in audit fees which rule out the increase in audit fees due to the change in revenue. One explanation for this could be that audit firms take into account the financial distress of their clients, as also identified during the financial crisis of 2008 (L. Chen et al., 2018; Krishnan & Zhang, 2014). The increased audit complexity and audit risks could make audit firms want to increase audit fees, but the harder financial situation of their client makes them decide not to increase audit fees. Another explanation could be that on average audit fees do not increase during COVID-19, but that this effect differs between certain types of industries or companies. We examined the effect between industries highly impacted by COVID-19 and industries less impacted by COVID-19, but there is a possibility that the effect of COVID-19 on audit fees differs between other things. For example differences in effect between small companies and large companies, or differences in effect between companies in different states.



The descriptive statistics in Table 4 show that the full sample varies from very small companies (total assets \$45,000) to very big companies (total assets \$551,669,000,000). To check whether the results in section 4.2 are consistent among smaller and bigger companies, we perform an additional analysis on a sample of small companies and a sample of big companies.

First, we divide the full sample into three parts based on total assets; small-size companies, average-size companies, and big-size companies. Then we perform the regression models of models 1, 2, and 3 on the sample of small companies and on the sample of big companies. The results of these regressions are reported in Table 9. We will not go over all the results in Table 9, but only discuss the results that stand out compared to the regressions on the full sample.

The first notable result is that for the sample of small companies, the coefficient on *Period* is negative and significant in models 1, 2, and 3 at  $p < 0.01$ ,  $p < 0.01$ , and  $p < 0.10$ , respectively. This suggests that COVID-19 has a significant effect on audit fees of small companies and that these audit fees decreased during COVID-19. Whereas we could not find a significant effect of COVID-19 on audit fees for the full sample, we do find a significant effect for the sample of small companies. Contrary to the results of model 2 with the full sample, the results of model 2 with the sample of small and big companies show that there is a significant effect between investment change and audit fees. The interaction coefficient on *InvChange* and *Period*, for the sample of small companies, is negative and significant at  $p < 0.05$ . This suggests that during COVID-19 there is a significant effect of investment change on audit fees. A decrease in investment change, which we used as a proxy for increased audit risk, results in higher audit fees. The coefficient on *InvChange*, for the sample of big companies, is negative and significant at  $p < 0.05$ , suggesting that there is a significant relationship between a decrease in investment change and audit fees. In other words, a decrease in investment change leads to higher audit fees. In the regression of model 2 on the full sample we did not find such an effect.

The results of this additional analysis are interesting in particular because they show that the effects of COVID-19 can differ between small and big companies.

## **5. Conclusion**

This study investigates whether COVID-19 has an effect on audit fees. The effect of COVID-19 on audit fees is examined in two ways. First, we look at the general effect of COVID-19 on audit fees, by using two determinants of audit fees; audit complexity and audit risk. Secondly, we

investigate the differences in the effect of COVID-19 on audit fees between industries highly impacted by COVID-19 and industries less impacted by COVID-19. Our results show that in general COVID-19 does not have an effect on audit fees. We also find that there is no significant difference in the effect of COVID-19 on audit fees between industries highly impacted by COVID-19 and industries less impacted by COVID-19. We do find a significant relationship between change in revenue and audit fees, a decrease in change in revenue causes audit fees to increase. Additional analysis shows that COVID-19 did have an effect on the change in revenue of companies. Besides that, additional analysis shows that there is a significant relationship between COVID-19 and audit fees if we look at a sample consisting of small companies. During COVID-19 audit fees decreased for the companies in our sample of small companies.

This study provides use contribution to existing literature. First, it is one of the first studies which examines the relationship between COVID-19 and audit fees. Although there is still room for improvement, this study can be used as a basis for further research on COVID-19 and audit fees. Secondly, this study provides an extension to the literature on determinants of audit fees, by documenting a significant relationship between change in revenue and audit fees.

This study also consists of multiple limitations. Firstly, the sample consists of US companies that are widely divergent in size, but also in other firm characteristics. The first regression analyses did not show an effect of COVID-19 on audit fees, but additional analysis showed that there is an effect of COVID-19 on audit fees for smaller companies. There could be more firm characteristics that cause differences in the effect of COVID-19 on audit fees which are not identified in this research. Secondly, the classification of industries as highly impacted is made based on industry characteristics such as cross-border trade, social interaction, and personnel intensity. There is a chance that there are industries which are highly impacted by COVID-19 but are excluded from the treatment group based on these characteristics, or vice versa. This could impact the reliability of the results regarding the differences between industries. Third, there is a lack of previous research studies on this topic. Because of this, hypotheses are mainly based on the comparable circumstances of the financial crisis of 2008, but there is a possibility that this comparison is too short-sighted.

## References

- ACCA. (n.d.). *The impact of COVID-19 on Audit and Assurance – challenges and considerations*.
- AFM. (2020). *Impact of COVID-19: points of attention for 2020 Audits*. <https://www.afm.nl/en/nieuws/2020/december/aandachtspunten-accountants-corona>
- Al-Harshani, M. O. (2008). The pricing of audit services: Evidence from Kuwait. *Managerial Auditing Journal*, 23(7), 685–696.
- Alexeyeva, I., & Svanström, T. (2015). The impact of the global financial crisis on audit and non-audit fees: Evidence from Sweden. *Managerial Auditing Journal*, 30(4–5), 302–323.
- Anderson, T., & Zéghal, D. (1994). The pricing of audit services: Further evidence from the Canadian market. *Accounting and Business Research*, 24(95), 195–207.
- Chan, P., Ezzamel, M., & Gwilliam, D. (1993). Determinants of audit fees for quoted UK companies. *Journal of Business Finance & Accounting*, 20(6), 765–786.
- Chen, H., Hua, S., Liu, Z., & Zhang, M. (2019). Audit fees, perceived audit risk, and the financial crisis of 2008. *Asian Review of Accounting*, 27(1), 97–111.
- Chen, L., Krishnan, G. V., & Yu, W. (2018). The relation between audit fee cuts during the global financial crisis and earnings quality and audit quality. *Advances in Accounting*, 43, 14–31.
- Deloitte. (n.d.). *Addressing the financial impacts of COVID-19*. Retrieved May 5, 2022, from <https://www2.deloitte.com/hr/en/pages/about-deloitte/solutions/addressing-the-financial-impacts-of-COVID-19.html>
- Deloitte. (2020). *The heart of resilient leadership: Responding to COVID-19*. <https://www2.deloitte.com/us/en/insights/economy/covid-19/heart-of-resilient-leadership-responding-to-covid-19.html>
- Dube, K., Nhamo, G., & Chikodzi, D. (2021). COVID-19 pandemic and prospects for recovery of the global aviation industry. *Journal of Air Transport Management*, 92, 102022.
- Firth, M. (1997). The provision of non-audit services and the pricing of audit fees. *Journal of Business Finance and Accounting*, 24(3–4), 511–525.
- Francis, J. R. (1984). The effect of audit firm size on audit prices: A study of the Australian market. *Journal of Accounting and Economics*, 6, 133–151.
- Gerrard, I., Houghton, K., & Woodliff, D. (1994). Audit fees: The effect of auditee, auditor, and industry differences. *Managerial Auditing Journal*, 9(7), 3–11.
- Ghosh, A., & Pawlewicz, R. (2009). The impact of regulation on auditor fees: Evidence from the Sarbanes-Oxley Act. *Auditing*, 28(2), 171–197.
- Gonthier-Besacier, N., & Schatt, A. (2007). Determinants of audit fees for French quoted firms. *Managerial Auditing Journal*, 22(2), 139–160.
- IAASB. (2020). *Highlighting areas of focus in an evolving audit environment due to the impact of COVID-19*. <https://www.iaasb.org/publications/highlighting-areas-focus-evolving-audit-environment-due-impact-covid-19-1>
- Ittonen, K., & Peni, E. (2012). Auditor's gender and audit fees. *International Journal of Auditing*, 16, 1–18.
- KPMG. (2020). *COVID-19 financial reporting implications*. <https://assets.kpmg/content/dam/kpmg/lk/pdf/covid-19-impact-on-financial-reporting-part-2.pdf>
- Krishnan, G. V., & Zhang, Y. (2014). Is there a relation between audit fee cuts during the global financial crisis and banks' financial reporting quality? *Journal of Accounting and Public Policy*, 33(3), 279–300.
- McKinsey & Company. (2022). *COVID-19 recovery in hardest-hit sectors could take more than 5 years*. <https://www.mckinsey.com/featured-insights/coronavirus-leading-through-the-crisis/charting-the-path-to-the-next-normal/covid-19-recovery-in-hardest-hit-sectors-could-take-more-than-5-years>
- National Library of Medicine. (2020). *The socio-economic implications of the coronavirus pandemic (COVID-19): A review*. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7162753/>
- Nicola, M., Alsafi, Z., Sohrabi, C., Kerwan, A., & Al-jabir, A. (2020). The socio-economic implications of the coronavirus pandemic (COVID-19): A review. *International Journal of Surgery*, 78, 185–193.
- Pong, C. M., & Whittington, G. (2007). The determinants of audit fees: Some empirical models. *Journal of Business Finance & Accounting*, 21(8), 167–194.
- S&P Global. (2022). *Industries Most and Least Impacted by COVID-19 from a Probability of Default Perspective*. <https://www.spglobal.com/marketintelligence/en/news-insights/blog/industries-most-and-least-impacted-by-covid-19-from-a-probability-of-default-perspective-january-2022-update>

- Sharif, A., Aloui, C., & Yarovaya, L. (2020). COVID-19 pandemic, oil prices, stock market, geopolitical risk and policy uncertainty nexus in the US economy: Fresh evidence from the wavelet-based approach. *International Review of Financial Analysis*, 70, 1–9.
- Shen, H., Fu, M., Pan, H., Yu, Z., & Chen, Y. (2020). The impact of the COVID-19 pandemic on firm performance. *Emerging Markets Finance and Trade*, 56(10), 2213–2230.
- The World Bank. (2021). *How COVID-19 is affecting companies around the world*. <https://www.worldbank.org/en/news/infographic/2021/02/17/how-covid-19is-affecting-companies-around-the-world>
- Thornton, D. B., & Moore, G. (1993). Auditor choice and audit fee determinants. *Journal of Business Finance & Accounting*, 20(3), 333–349.
- World Health Organization. (2020). *WHO announces COVID-19 outbreak a pandemic*. <https://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/news/news/2020/3/who-announces-covid-19-outbreak-a-pandemic>
- Xu, Y., Carson, E., Fargher, N., & Jiang, L. (2013). Responses by Australian auditors to the global financial crisis. *Accounting and Finance*, 53, 301–338.

## Appendix

**Table 1.** Variable Definitions

<b>Variable:</b>	<b>Definition:</b>
<i>AuditFees</i>	total audit fees for the current period
<i>Treated</i>	indicator variable equal to one if industries is classified as highly impacted by COVID-19, and zero otherwise
<i>Period</i>	indicator variable equal to one for the year during COVID-19, and zero otherwise
<i>RevChange</i>	change in revenue, measured by: (current period total revenue – prior period total revenue) / prior period total revenue
<i>InvChange</i>	change in investments, measured by: (current period total investments – prior period total investments) / prior period total investments
<i>Size</i>	size of a company, measured by the total assets
<i>Leverage</i>	leverage of a company, measured by: total liabilities / total equity
<i>Big4</i>	indicator variable equal to one if the firm’s auditor is one of the Big 4 audit firms, and zero otherwise

*Note: This table details the variables and definitions for audit fees analyses.*

**Table 2.** Sample Selection

<b>Sample Selection for Audit Fee analysis</b>	
US-listed firms with available data on selected financial variables for the years 2018-2020	7,200
Less: Those with missing observations for either 2018, 2019 or 2020	(5,404)
Less: Those with fiscal year-end other than the 31 <sup>st</sup> of December	(170)
Less: Those in financial services industries (SIC codes 6000-6999)	(650)
Less: Those with a missing value for audit fees	(9)
Number of firms used in audit fee analysis	<b>967</b>

*Note: This table details the sample selection process for auditor fees analyses.*

**Table 3.** Distribution of Audit Fees per GICS code per year

GICS code	Change in Audit Fees					
	2018		2019		2020	
	Audit Fees	Change	Audit Fees	Change	Audit Fees	Change
1010	311,134	2.18%	313,054	0.63%	313,171	-5.80%
1510	285,963	14.90%	302,876	10.01%	282,189	-1.67%
2010	456,056	11.67%	433,371	4.01%	437,057	3.16%
2020	68,988	8.74%	64,167	-4.77%	61,625	-2.80%
2030	107,367	4.42%	104,313	0.18%	110,660	7.22%
2510	155,145	178.79%	154,856	-4.47%	148,480	-2.24%
2520	38,475	-1.40%	37,091	-0.52%	37,624	-0.89%
2530	166,688	178.54%	166,074	3.72%	163,964	7.74%
2550	69,689	11.37%	78,897	23.30%	89,968	14.59%
3010	799	-40.33%	859	21.44%	966	16.60%
3020	160,749	-0.34%	168,111	3.92%	174,120	3.09%
3030	43,556	13.53%	43,794	13.23%	46,343	-9.79%
3510	174,036	28.85%	183,144	12.61%	182,984	5.24%
3520	467,676	63.71%	482,403	12.40%	496,923	10.60%
4020	27,623	11.74%	30,142	16.44%	26,310	-14.20%
4510	217,136	51.84%	227,298	10.91%	229,072	8.42%
4520	140,853	9.41%	134,073	1.18%	131,900	20.84%
4530	86,230	4.86%	85,432	-1.82%	90,565	7.56%
5010	205,514	1.64%	209,959	-2.86%	205,410	-3.18%
5020	169,273	22.65%	183,734	6.73%	180,974	2.73%
5510	218,139	4.05%	225,710	4.72%	228,977	-0.24%
6010	1,167	-3.03%	1,055	-6.30%	1,166	10.25%
Total high	1,097,150	46.67%	1,107,070	2.77%	1,116,844	1.92%
Total normal	2,475,105	31.74%	2,523,344	8.19%	2,523,605	6.11%
Total	3,572,255	35.91%	3,630,414	6.68%	3,640,449	4.94%

Note: This table details the change in audit fees over the years 2018-2020. The change is displayed per GICS code. The GICS codes which are classified as highly impacted by COVID-19 are marked grey. All values of audit fees are displayed in 1,000 \$.

**Table 4.** Descriptive statistics

Variables	N	Mean	Std	Min	Max
AuditFees	2,901	3,737	6,433	13	92,200
RevChange	2,901	0.062	0.224	-0.359	0.448
InvChange	2,901	0.096	0.245	-0.366	0.486
Size	2,901	14,454,330	42,744,142	45	551,669,000
Leverage	2,901	1.554	1.211	0.008	3.643
Big4	2,901	0.810	0.392	0.000	1.000

Note: This table details the descriptive statistics for variables used in the audit fees analyses. All financial values are displayed in 1,000 \$.

**Table 5. Correlation Matrix**

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>AuditFees</i> (1)							
<i>RevChange</i> (2)	<b>-0.07</b>						
<i>InvChange</i> (3)	<b>-0.05</b>	<b>0.37</b>					
<i>Size</i> (4)	<b>0.75</b>	<b>-0.06</b>	-0.04				
<i>Leverage</i> (5)	<b>0.26</b>	<b>-0.09</b>	<b>-0.13</b>	<b>0.14</b>			
<i>Big4</i> (6)	<b>0.23</b>	<b>0.08</b>	<b>0.08</b>	<b>0.16</b>	<b>0.09</b>		
<i>Period</i> (7)	0.00	<b>-0.17</b>	-0.01	0.01	0.03	-0.01	
<i>Treated</i> (8)	0.04	<b>-0.11</b>	<b>-0.07</b>	<b>0.11</b>	<b>0.25</b>	<b>0.06</b>	0.00

Note: This table details the correlation between the variables used in the audit fee analyses. Correlation coefficients statistically significant at  $p < 0.01$  are in bold.

**Table 6. Regression of COVID-19 on Audit Fees**

Variable	Baseline model		Model 1		Model 2	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
<i>Intercept</i>	-416,536	0.036**	-376,216	0.060*	-385,130	0.056*
<i>Period</i>	-127,549	0.425	-175,933	0.279	-128,934	0.422
<i>RevChange</i>			-597,267	0.084*		
<i>RevChange*Period</i>			-122	0.981		
<i>InvChange</i>					-348,613	0.274
<i>InvChange*Period</i>					2,966	0.959
<i>Size</i>	0.107	0.000***	0.108	0.000***	0.108	0.000***
<i>Leverage</i>	794,523	0.000***	784,803	0.000***	785,190	0.000***
<i>Big 4</i>	1,732,121	0.000***	1,765,740	0.000***	1,753,861	0.000***
N	2,901		2,901		2,901	
Adj-R <sup>2</sup>	0.603		0.603		0.602	

Note: This table reports regression results of COVID-19 on audit fees. *Period* is an indicator variable equal to one for the period during the COVID-19 pandemic, and zero otherwise. \*, \*\*, \*\*\* indicate statistical difference from zero (two-tailed) at the  $<0.10$ ,  $<0.05$ , and  $<0.01$  levels, respectively. Variable definitions are included in the Appendix, table 1.

**Table 7. Regression of difference in effect between industries of COVID-19 on Audit Fees**

Variable	Model 3	
	Coeff.	p-value
<i>Intercept</i>	-272.970	0.174
<i>Period</i>	-114.061	0.541
<i>Treated</i>	-1,300.917	0.000***
<i>Treated*Period</i>	-82.709	0.815
<i>Size</i>	0.109	0.000***
<i>Leverage</i>	909.892	0.000***
<i>Big 4</i>	1,767.627	0.000***
N	2,901	
Adj-R <sup>2</sup>	0.610	

Note: This table reports regression results of COVID-19 on audit fees, looking at the differences between highly impacted industries and industries less impacted by COVID-19. *Period* is an indicator variable equal to one for the period during the COVID-19 pandemic, and zero otherwise. *Treated* is an indicator variable equal to one for industries highly impacted by COVID-19, and zero otherwise. \*, \*\*, \*\*\* indicate statistical difference from zero (two-tailed) at the  $<0.10$ ,  $<0.05$ , and  $<0.01$  levels, respectively. Variable definitions are included in the Appendix, table 1.

**Table 8. Additional Analysis**

<b>Panel A: Change in Revenue over 2018-2020</b>						
GICS	2018		2019		2020	
	Change		Change		Change	
1010	19,46%	-1,13%	-21,57%			
1510	8,40%	1,61%	-4,42%			
2010	9,61%	2,72%	-5,24%			
2020	8,94%	2,25%	0,49%			
2030	12,40%	4,78%	-16,63%			
2510	11,69%	6,94%	-7,03%			
2520	13,40%	4,13%	7,04%			
2530	11,55%	10,65%	-16,48%			
2550	14,64%	12,90%	9,76%			
3010	0,94%	13,76%	18,31%			
3020	-0,33%	1,35%	-2,46%			
3030	13,36%	3,94%	3,71%			
3510	16,58%	13,60%	3,53%			
3520	12,78%	7,09%	13,58%			
4020	15,26%	7,17%	-3,21%			
4510	18,31%	16,00%	9,04%			
4520	3,97%	-0,63%	-3,11%			
4530	3,54%	3,54%	18,18%			
5010	2,62%	-1,29%	-5,63%			
5020	16,24%	13,88%	3,50%			
5510	3,17%	4,56%	-5,39%			
6010	34,41%	35,78%	9,74%			

<b>Panel B: Regression Results</b>				
Variable	Model 4		Model 5	
	Coeff.	p-value	Coeff.	p-value
Intercept	0.124	0.000***	0.114	0.000***
Period	-0.084	0.000***	-0.039	0.000***
Treated			0.005	0.666
Period*Treated			-0.164	0.021**
Size	-0.000	0.007***	-0.000	0.000***
Leverage	-0.019	0.000***	-0.014	0.000***
N	2,901		2,901	
Adjusted-R <sup>2</sup>	0.043		0.073	

Note: Panel A displays the average change in revenue for each industry based on GICS code. Industries that are identified as highly impacted by COVID-19 are marked grey. Panel B reports regression results of COVID-19 on change in revenue. Period is an indicator variable equal to one for the period during the COVID-19 pandemic, and zero otherwise. Treated is an indicator variable equal to one for industries highly impacted by COVID-19, and zero otherwise. \*, \*\*, \*\*\* indicate statistical difference from zero (two-tailed) at the <0.10, <0.05, and <0.01 levels, respectively. Variable definitions are included in the Appendix, table 1.



**Table 9.** Regression of COVID-19 on Audit Fees difference between small and big companies

Variable	Model 1		Model 2		Model 3	
	<i>small</i> Coeff.	<i>big</i> Coeff.	<i>small</i> Coeff.	<i>big</i> Coeff.	<i>small</i> Coeff.	<i>big</i> Coeff.
<i>Intercept</i>	149,840***	-547,619	148,368***	-600,958	152,011***	-449,040
<i>Period</i>	-76,692**	-498,940	-69,243**	-391,274	-68,219*	-367,783
<i>RevChange</i>	7,040	-3,972,418**				
<i>RevChange*Period</i>	627	3,401,821**				
<i>InvChange</i>			-6,256	-3,067,073**		
<i>InvChange*Period</i>			-15,334**	191,904		
<i>Treated</i>					-63,480	-3,353,494***
<i>Treated*Period</i>					-52,691	15,913
<i>Size</i>	1.518***	0.095***	1.554***	0.095***	1.550***	0.097***
<i>Leverage</i>	141,018***	1,192,236***	135,668***	1,150,484***	148,055***	1,368,380***
<i>Big 4</i>	247,837***	2,963,652*	249,822***	3,099,087**	240,435***	3,454,122**
N	966	966	966	966	966	966
Adj-R <sup>2</sup>	0.325	0.511	0.325	0.510	0.327	0.538

*Note: This table reports regression results of COVID-19 on audit fees for small and big companies. Period is an indicator variable equal to one for the period during the COVID-19 pandemic, and zero otherwise. Treated is an indicator variable equal to one for companies which are classified as highly impacted by COVID-19, and zero otherwise. \*, \*\*, \*\*\* indicate statistical difference from zero (two-tailed) at the <0.10, <0.05, and <0.01 levels, respectively. P-values are not displayed separately. Variable definitions are included in the Appendix, table 1.*