Journal of
Risk and Financial Management

MDPI

Article

COVID-19-Related Audit Report Disclosures: Determinants and Consequences

Joseph A. Micale [1,*] and Joon Ho Kong [2]

[1] Martin Tuchman School of Management, New Jersey Institute of Technology, Newark, NJ 07103, USA
[2] School of Business, Stevens Institute of Technology, Hoboken, NJ 07030, USA
* Correspondence: joseph.a.micale@njit.edu

Abstract: In this study, we identified firms receiving COVID-19-related audit report disclosures through critical audit matter (CAM) mentions of COVID-19 in their audit reports. Through OLS regressions, we then investigated the fundamental accounting and auditing determinants that predict the likelihood of firms to receive these COVID-19-related disclosures, and found that firms with intangibles and goodwill were more likely to have these mentioned in their audit reports. Next, we examined the content of these disclosures and found that auditors' COVID-19 disclosures focused on significant accounting estimates (e.g., fair value accounting and asset impairment considerations). These results are consistent with the idea that COVID-19-related uncertainty represented a triggering event to firms, who then reassessed the carrying value of these long-term assets. After exploring the spillover effects to outsiders, we found that investors obtained a 7.3 basis point for abnormal returns following COVID-19 report disclosures and that auditors were able to charge these firms USD 452,000 higher audit fees relative to benchmark firms. The results are also consistent in entropy-balanced estimations and two-stage analyses that address endogeneity.

Keywords: COVID-19; coronavirus; impairment; audit report; audit fees; critical audit matters; goodwill

JEL Classification: G01; G10; M41; M42

check for updates

Academic Editor: Rania Mousa

Received: 27 November 2024
Revised: 21 December 2024
Accepted: 26 December 2024
Published: 8 January 2025

Citation: Micale, J. A., & Kong, J. H. (2025). COVID-19-Related Audit Report Disclosures: Determinants and Consequences. *Journal of Risk and Financial Management*, *18*(1), 21. https://doi.org/10.3390/jrfm18010021

Copyright: © 2025 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (https://creativecommons.org/licenses/by/4.0/).

1. Introduction

The emergence of COVID-19 and the resulting pandemic brought widespread global economic uncertainty (Caggiano et al., 2020; Szczygielski et al., 2021; Altiga et al., 2020). While research has investigated the effects of the COVID-19 pandemic on health outcomes, as well as public health measurements on virus spread, regulatory policies, and macroeconomic events (Harris, 2020; Greenstone & Nigam, 2020; Parmet & Sinha, 2020; Ozili & Arun, 2020; McKibbin & Fernando, 2020; Sajadi et al., 2020; Bukhari & Jameel, 2020), the full impact of this economic uncertainty in the corporate sector is still relatively unknown.[1] In particular, the accounting implications of this COVID-19-induced economic uncertainty on firms have not been sufficiently researched in the academic literature. This study aims to fill this gap in the literature by first identifying publicly listed U.S. companies with mentions of COVID-19 in the critical audit matters (CAMs) of their audit reports. This is the first study to investigate the use of COVID-19-related audit report disclosures issued by auditors in a novel setting. Therein, we are the first to investigate the use of these disclosures by auditors in assessing which accounting fundamentals act as determinants to firms receiving these disclosures from auditors in relation to COVID-19. We then investigate the types and

topics of COVID-19 disclosures, such as those representing accounting uncertainties (e.g., accounting estimates, fair value accounting disclosures, etc.). These tests are also important to our understanding of auditors' use of CAMs relating to accounting issues that have high degrees of uncertainty. Finally, we tested the subsequent effects on both shareholders and stakeholders, analyzing abnormal stock returns around the disclosures and the audit and abnormal audit fees charged by auditors.

We first investigated the determinants for firms to receive these COVID-19-related disclosures from auditors and found that, consistent with our expectations, firms with high levels of goodwill and identifiable intangible assets were statistically more likely to receive mentions of COVID-19 in their audit reports. After disaggregating mentions of COVID-19 by type and topic, we found that auditor disclosures around COVID-19 were more likely to present issues regarding significant accounting estimates, as well as matters relating to fair value accounting and asset impairments. Taken together, our findings suggest that COVID-19 represented a triggering event that caused companies to reassess the fair value of their long-term assets under Accounting Standards Codification (ASC) Topic 350, Intangibles–Goodwill and Other.

We next investigated whether COVID-19 uncertainty, proxied by these audit report disclosures, provided material, uncertainty-mitigating information to financial statement users by analyzing market reactions to auditor report issuances. We created the expected daily returns for each firm based on daily regressions from the market model over a period from -300 to -46, then created the daily abnormal returns for the three days before and after the audit report was issued. We plotted these returns and found a large increase in abnormal returns during the (0, +3) period for firms with mentions of COVID-19, while the other firms had minimal abnormal returns. We observed a large jump on the day following the audit report issuance and, while there was market correction over the following two days, the overall CARs during this period were positive (0.073%) for the focal firms. Regression analyses confirm these results, demonstrating that market reactions are concentrated in the (+1, +3) window following audit report issuances. Other graphical analyses suggest this effect is stronger when a firm's financial performance is strong (e.g., profit firms, no going concerns, no restatements) and when disclosures reduce uncertainty (e.g., non-impairment, non-fair value, significant accounting estimates).

Finally, we investigated the subsequent effects on firms' audit costs and found that firms receiving COVID-19 mentions in their audit reports were associated with 17.2% higher audit costs (USD 452,000) and 8% higher abnormal audit costs relative to firms without COVID-19 mentions, likely due to the additional efforts needed from auditors to verify the complicated nature of the asset impairment assessments. Meanwhile, firms receiving COVID-19 mentions relating to asset impairment considerations were associated with 25.6% higher audit fees and 13.1% higher abnormal audit fees. In more granular tests, we found that matters relating to fair value accounting and going concerns also reflected higher fees for firms receiving COVID-19 mentions relative to firms that did not receive these audit reports. Finally, in the untabulated results, we delved deeper into the content of the COVID-19 mentions, noting that the COVID-19 mentions relating to quantitative "Step 2" impairment analyses were associated with higher audit fees, while those with mentions relating to qualitative "Step 1" analyses were not.

We also prepared several sensitivity analyses. First, we reperformed all of our analyses after reweighting the covariates based on entropy balancing (Hainmueller, 2012) and found consistent results. Reweighting limited the effects of the fundamental differences in observable characteristics to support our main findings. Next, in an attempt to extract the likelihood that firms received COVID-19-related audit reports due to a general risk of epidemic diseases, we merged our data with the Covid and epidemic disease risk data in

Hassan et al. (2023). After extracting portions of the likelihood of receiving a COVID-19-related audit report disclosure due to general epidemic risk, we found consistent results. This robustness check suggests that general epidemic risk does not drive our main findings and supports the idea that COVID-19 uncertainty and risk, specifically, provided accounting and auditing challenges to firms and their auditors.

Understanding which firms were most impacted by COVID-19 and its related uncertainty, as well as to what extent COVID-19 impacted these firms are important questions to the academic literature, and thus, our research has several contributions. First, our research demonstrates that COVID-19 had accounting implications for firms, which the literature has yet to fully investigate. We find evidence consistent with the idea that COVID-19 uncertainty created significant uncertainty around managers' expectations of future cash flows, thus causing a triggering event in which firms must consider reassessing the carrying value of non-current assets. These COVID-19 mentions by auditors suggest that auditors' verification of managers' analyses regarding this triggering event were particularly complicated and/or needed significant auditor judgment, which required additional effort by the auditor, resulting in increased audit costs to the client. Second, our findings have broader implications about the relationship between this firm-specific economic uncertainty and the ability of the auditor to audit (significant) accounting estimates as well as auditor reporting, which has yet to be investigated in the literature. While other measures of economic uncertainty are macro-level (Baker et al., 2016), we identify firm-specific implications of economic uncertainty, and demonstrate that this increased economic uncertainty forced greater audit effort by the auditor and higher costs to firms as managers assess the carrying values of these long-term assets.

Our paper also contributes to the literature on understanding auditors' use of CAMs (Suljac, 2021; Garcíaa et al., 2019; Gimbar et al., 2016; Brasel et al., 2016), providing insight into how auditors choose to discuss COVID-19 uncertainty in the audit report through CAMs. Our tests provide descriptive evidence on how auditors utilize audit report disclosures in the presence of COVID-19 uncertainty and broader economic uncertainty, both in the frequency and content of disclosures. Since prior research suggests that the use of CAMs reduces auditor liability (Backof et al., 2014; Kachelmeier et al., 2020), auditors' COVID-19 mentions may also speak to how auditors perceive potential litigation following COVID-19. Our market reaction tests also suggest that these auditor disclosures in the audit report help regulators in achieving their goal to provide more informative audit reports to financial users (PCAOB, 2019), as investors use and trade on the information content of these disclosures.

Finally, our paper also has broader implications around the determinants of goodwill impairments and the relationship between firms' non-current asset impairment assessments and auditor costs and reporting. Our research builds on Huikki et al. (2017), whose qualitative findings suggest that goodwill impairment tests utilize accounting information and other inputs beyond clients' general ledgers and accounting records. We find archival evidence in line with this as our COVID-19 mentions of goodwill impairment largely relate to auditor's need to review financial projections around macroeconomic uncertainty due to COVID-19 when assessing goodwill. Moreover, our CAM findings suggest that auditors do attempt to verify managers' "unverifiable" estimates of the current fair value of goodwill as suggested by Ramanna and Watts (2012).

2. Institutional Knowledge and Hypothesis Development

2.1. Institutional Knowledge

2.1.1. COVID-19 General Information

There were more than 238 million cases of COVID-19 worldwide, resulting in nearly 5 million deaths (more than 1,000,000 in the United States) (New York Times [NYT], 2022b; Johns Hopkins Coronavirus Resource Center, 2021). The pandemic is estimated to have cost up to USD 16 trillion to the U.S. economy (Cutler & Summers, 2020). In the U.S., economic uncertainty was particularly high in the early days of the pandemic and throughout 2020. For example, early evidence (Harris, 2020) estimated that COVID-19 cases began to flatten in late March 2020; however, ex-post evidence suggests that the 2020 peak in new cases was 10 April 2020, and the largest spike in new cases was in January 2021 (New York Times [NYT], 2021a). Moreover, research studies and public media questioned whether or not COVID-19 effects would last past the first summer in the United States (Bukhari & Jameel, 2020), which in hindsight was overly optimistic.

2.1.2. COVID-19 Public Healthcare and Economics Research

Ozili and Arun (2020) classify the spillover effects of COVID-19 on the global economy in two ways: (1) preventative measures such as shutdowns of financial markets, corporate offices, businesses, and events, and (2) the heightened uncertainty around the spread of the virus reducing consumers' consumption patterns and decreased investor demands for economic activity. Both of these factors had immediate effects on firms' stock prices and those of related stock market indices. These are, of course, measurable risks, but there are many factors that are not measurable, and therein lies the uncertainty created by the COVID-19 pandemic. It is this uncertainty that is the main driver of "panic, paralysis, and fear" (Disparte, 2021) among consumers.

Study suggests that the 1918 Flu Pandemic could have presented less uncertainty throughout the economy (Correia et al., 2020),[2] which one can extrapolate to COVID-19 to mean that unilateral adoptions of public health measures could have provided overall better economic outcomes. Similarly, Greenstone and Nigam (2020) estimate that moderate social distancing could have created mortality benefits of about USD 8 trillion. Since public health measures were adopted (or not adopted) to differing extents and varied across time by U.S. cities and states, these non-unilateral adoptions are likely to boost economic uncertainty for firms, particularly those with geographic dispersion or those that operate in more than one state, city, or territory.

2.1.3. The Impact of COVID-19 Uncertainty on Firms and Auditors—General

"The evolution of the disease and its economic impact is highly uncertain", which has challenged policymakers to direct relevant and suitable macroeconomic policies (McKibbin & Fernando, 2020), likely causing a trickle down of economic uncertainty to firms and their auditors. Hong et al. (2021) model COVID-19 damages on corporate earnings using earnings revisions, implying that firms are likely to experience earnings crashes and lower earnings growth expectations from managers until COVID-19 vaccine arrivals. Moreover, the impact on auditing is likely to be larger for industries more impacted by COVID-19 given the larger uncertainty for those industries. In particular, Public Company Accounting Oversight Board (PCAOB) member, Megan Zietsman, discussed at *the AICPA Conference on Current SEC and PCAOB Developments* that PCAOB inspectors will increase their focus on audits of companies in the transportation, entertainment, hospitality, manufacturing, and retail spaces (Tysiac, 2021).

2.1.4. The Impact of COVID-19 Uncertainty on Firms and Auditors—Accounting Perspective

The implications of COVID-19 uncertainty on firms' accounting and financial reporting largely focus on practitioner expectations and guidance from regulatory bodies such as the AICPA, FASB, SEC, and PCAOB, as well as third-party institutions such as the Center for Audit Quality (CAQ). Of these, the two main areas of focus by these groups are around going concern opinions and asset impairment considerations for non-financial assets. In remarks to the Center for Audit Quality in June 2020, SEC Chief Accountant, Sagar Teotia, highlighted that GCOs will be an issue for auditors during the pandemic.[3] Comments by members of the AICPA (Radigan, 2021) support this view, suggesting that going concern assessments will be a large challenge to both firms and their auditors:

> *"Now with the updated U.S. GAAP and U.S. generally accepted auditing standards requirements, entities have to make a going concern assessment based upon whether it's probable that they will be unable to meet their obligations within one year from the issuance of the financial statements, not the balance sheet date. The increased difficulty caused by the longer period is compounded by the uncertainty arising from the unprecedented nature of the pandemic and its recession".*

Another member of the AICPA argued that the number one most likely issue to impact publicly traded companies from the COVID-19 pandemic is "Impairment related to non-financial assets" (Noll, 2020). These impairments are likely to relate to non-current assets on the balance sheet, focusing largely on those assets with high estimation uncertainty—identifiable intangible assets and goodwill. The uncertainty around COVID-19 calls into question firms' expected future cash flows and, therefore, under FASB ASC 350, "many entities are likely to conclude that triggering events occurred, causing them to perform impairment testing" (American Institute of CPAs [AICPA], 2020).

2.1.5. Critical Audit Matters (CAMs)

Auditing Standard (AS) 3101.11 defines CAMs as "any matter arising from the audit of the financial statements that was communicated or required to be communicated to the audit committee and that: (1) relates to accounts or disclosures that are material to the financial statements and (2) involved especially challenging, subjective, or complex auditor judgment (PCAOB, 2017)". Auditors are required to provide these disclosures in the audit report for certain firms beginning for audit reports dated as of 30 June 2019. CAMs are composed of two parts—a description of the matter and the auditor's response to the matter. Several recent papers have investigated the impact of these disclosures on auditors' liability and found that CAM disclosures by auditors can reduce auditor liability (Backof et al., 2014; Kachelmeier et al., 2020), though not when CAM disclosures brought forth attention to instances where undetected misstatements would have been hard to uncover otherwise (Brasel et al., 2016). This may suggest that auditors favor additional disclosures to reduce potential legal claims against the audit firm. Whether auditors specifically mention or exclude COVID-19 from these CAMs may indicate how auditors view their potential liability to stakeholders as a function of COVID-19 uncertainty.

2.2. Hypothesis Development

An important aspect in theorizing the potential determinants for a company to receive a COVID-19-related auditor report is the macroeconomic uncertainty induced by COVID-19. This uncertainty presents systematic risk to all corporate sector participants; however, it is likely to create firm-specific uncertainty and risk around management's expectations of future cash flows, contingent on the extent that this uncertainty would impact firms' across a variety of factors. A first-order effect, most likely, is that this uncertainty will impact

firms in the short run (Radigan, 2021; Murphy, 2020). The COVID-19 global pandemic included several state-, region-, and country-wide lockdowns, limiting business operations for many firms during these periods. Moreover, these lockdowns had subsequent effects on businesses through shipping delays, reduced customer demands for particular products, and disruptions to the accounting and economic cycles of firms (Bloomberg Law, 2022; New York Times [NYT], 2022a; New York Times [NYT], 2021b). These issues are likely to create liquidity risks for firms by reducing short-run cash inflows, particularly for unprofitable firms and those firms operating on thin cash flows from operating activities pre-pandemic, and this can warrant a going concern opinion for clients.

While financial statements are typically prepared under the assumption that the firm will continue to operate indefinitely (Financial Accounting Standards Board [FASB], 2014), these short-run disruptions to positive operating cash flow activities may require the auditor to doubt the ability of the company to continue its operations beyond the following fiscal year. If COVID-19 casts a substantial doubt about a company's ability to continue as a going concern, the auditor is likely to modify the report with a going concern opinion (GCO). However, the auditor is still likely to present an audit report disclosure for COVID-19 whether or not COVID-19 created a *substantial* doubt about a company's ability to continue as a going concern because this matter is highly reliant on auditors' professional judgment, which is a key requirement for these disclosures.

On the other hand, many firms maintain significantly high levels of cash and cash equivalents, and healthy firms operating in areas with minimal lockdown procedures may not be as hindered and would continue to operate without receiving a going concern opinion in the near future. Moreover, COVID-19 lockdowns were largely regional in nature and were staggered across time and geographic location. As such, firms may have been able to reallocate resources and business operations to the extent that the overall financial health at the entity level was not cast into *substantial* doubt. Finally, several governmental options for access to liquid capital were available to firms through the largest stimulus bill and most comprehensive aid package in the history of the United States, the American Rescue Plan (Siegel, 2021). As such, firms may have been able to bear the brunt of COVID-19 adverse effects in the short run from cash inflows from the Paycheck Protection Program (PPP) (including loan forgiveness) or low-interest loans from the Small Business Administration (SBA).

A more likely overlooked, but still important, potential effect of this COVID-19 economic uncertainty is likely to have greater impacts on long-run estimations of future expected cash flows, given the long-term window for these estimations (Deloitte, 2020; KPMG, 2020). For example, fair value estimates of non-current assets rely considerably on macro-economic, industry-specific, and firm-level projections and growth rates far into the future (American Institute of CPAs [AICPA], 2003). As such, the economic uncertainty of COVID-19 may present challenges to firms and auditors in assessing potential future impairment risks for non-current assets, particularly when the assets are intangible in nature (Tysiac, 2021; Murphy, 2020). The accounting rules of *ASC 350: Intangibles-Goodwill and Other* present specific rules for firms to annually assess whether the fair value of intangible assets will "more likely than not" dip below the carrying value of the asset. The first step to applying these rules is that managers must estimate whether "facts or circumstances" have changed to the extent that this "more likely than not" dip has actually occurred (i.e., Step One: Qualitative). When these facts or circumstances have changed, a triggering event has occurred, meaning managers must actively recalculate the fair value of intangible assets and consider whether an impairment of the carrying value has occurred (i.e., Step Two: Quantitative). Therefore, one might expect COVID-19 to present a triggering event to firms,

forcing managers to re-evaluate the carrying value of recorded identifiable intangible assets and goodwill.

In addition, the accounting for intangible assets is complex, with fair value measurement being particularly complicated (KPMG, 2019) and the auditor's obligation to verify the fair value measurements of intangible assets is particularly difficult (A.U. Section 328; American Institute of CPAs [AICPA], 2014). Given the uncertainty in input classifications such as industry growth rates, potential macroeconomic policies, and projected consumer demand needed for use in these asset impairment models, verifying the likelihood of impairment by the auditor, whether qualitative or quantitative, would require significant professional judgment and a "critical audit matter" (CAM) disclosure in the auditor report. Practitioner and industry guidance support this outlook in that the American Institute of Certified Public Accountants (AICPA) expects that the most important COVID-19-related issue that impacts publicly traded companies is impairment related to non-financial assets (Noll, 2020; Murphy, 2020) and that "many entities are likely to conclude that triggering events occurred, causing them to perform impairment testing" (American Institute of CPAs [AICPA], 2020).

Given the counterarguments for which accounting fundamentals are more likely to predict a company's likelihood of receiving a COVID-19-related audit report disclosure, we present our hypotheses in the null format.

Hypothesis 1a: *Cash is not associated with the likelihood of receiving a COVID-19 audit report disclosure.*

Hypothesis 1b: *Cash Flows from Operating Activities are not associated with the likelihood of receiving a COVID-19 audit report disclosure.*

Hypothesis 1c: *Intangible Assets are not associated with the likelihood of receiving a COVID-19 audit report disclosure.*

Hypothesis 1d: *Goodwill is not associated with the likelihood of receiving a COVID-19 audit report disclosure.*

3. Research Design and Sample

3.1. COVID-19 Reports

Auditors are required to provide CAM disclosures to firms beginning after 30 June 2019. In these disclosures, auditors provide matters that were difficult to address during the audit and the response by the auditor to address the issue. We begin our investigation of COVID-19 uncertainty by isolating the auditors' report in firms' 10-K filings and utilizing textual analyses to identify instances of COVID-19 mentions in these disclosures. More specifically, we search for the following keywords and relevant stems in the audit report: "COVID", "COVID-19", "coronavirus", "pandemic". We identify audit reports with these mentions as a *COVID REPORT*, which is an indicator variable equal to one when the firm's audit report mentions COVID-19-related key words, and 0 otherwise. We manually review each audit report, utilizing context around the COVID-19 mention for further classifications, which we define later.

3.2. Data and Sample

Table 1 Panel A provides the sample selection criteria for this paper, which begins with the universe of Compustat firm-year observations for necessary accounting fundamental data, then we merge with Audit Analytics to obtain information on auditor-specific characteristics such as Big4 affiliation, auditor tenure, and audit fees as well as audit report

information. We require non-missing audit report dates, which allows us to verify a specific audit report was issued for the firm. We note that the COVID-19 citations in auditor reports primarily stem from auditor disclosures of CAMs, and as such, we limit the testing period from the beginning of the CAM period in the United States of 30 June 2019. This also limits the influence of time-varying characteristics across only 2 fiscal years of data. After requiring non-missing values for all covariates, our sample is reduced to 11,498 firm-year observations across 5651 unique firms.[4] More broadly, this data and sample configuration allows us to first assess which accounting fundamentals predict the likelihood for a firm to receive these COVID-19-related auditor disclosures. In further analyses of the study, we utilize detailed CAM information from Audit Analytics to assess content of CAM disclosures relating to COVID-19 and stock price and return data from CRSP to assess subsequent impacts to stockholder values.

Panel B provides detailed information on COVID-19 audit reports. This focal group has 403 firm-year observations, which, through manual review, we classify into the sub-grouping classifications of Johnson and Wiley (2019) for accounting estimates, significant accounting estimates, or non-estimates. Of these 403 audit reports, approximately 76% represent audit reports with accounting estimate disclosures. Significant accounting estimates, exclusively, represent 75%. Meanwhile, the remaining 24% are CAMs not addressing accounting estimates.[5]

Panel C describes the COVID-19 audit reports by another classification, accounting topic, and we note that the majority relate to issues of fair value accounting. These 322 COVID-19 mentions represent 80% of all COVID-19 mentions. Other than the 322 fair value accounting audit reports, 63 also relate to either GCOs or emphasis of matter reports, and finally, 18 address matters of historical cost accounting. Overall, this evidence suggests that impairment considerations are the most relevant issues impacting firms with COVID-19 mentions in the audit report. Appendix B demonstrates key examples of audit reports for going concerns, fair value accounting, and historical cost accounting, respectively. Whether there is a specific style to the prose and format in the auditors' disclosure of these COVID-19 mentions is an interesting question, but one outside the scope of this paper, which we encourage future research to investigate.

Panel D provides our sample disaggregated by industry at the one-digit SIC industry level. Overall, the industries are well distributed, with construction, retail, and manufacturing having the largest percentage of the sample at 22.04, 21.06, and 18.17 percent, respectively.

3.2.1. Research Design

Since the determinants of receiving a COVID-19 auditor report are empirical questions, we provide a logit determinant model with right-hand side explanatory variables relating to the major classes of items on the balance sheet, income statement, and statement of cash flows. Equation (1) outlines this specification.

$$\begin{aligned} COVID\ REPORT_{it} = {} & \beta_0 + \beta_1 CASH_{it} + \beta_2 AR_{it} + \beta_3 INVENTORY_{it} + \beta_4 PPE_{it} + \beta_5 INTANGIBLE_{it} + \beta_6 GOODWILL_{it} \\ & + \beta_7 AP_{it} + \beta_8 DEFERRED\ REV_{it} + \beta_9 DEBT_{it} + \beta_{10} RETAINED\ EARNINGS_{it} + \beta_{11} DIVIDENDS_{it} + \\ & \beta_{12} COMMON\ STOCK_{it} + \beta_{13} REVENUES_{it} + \beta_{14} COS_{it} + \beta_{15} SGA_{it} + \beta_{16} R\&D_{it} + \beta_{17} CAPEX_{it} + \\ & \beta_{18} ADVERTISING_{it} + \beta_{19} NET\ INCOME_{it} + \beta_{20} SPI_{it} + \beta_{21} CASH\ FLOWS_{it} + \lambda_i Industry\text{-}FE + \varepsilon_{it} \end{aligned} \quad (1)$$

Table 1. Sample selection criteria.

Panel A:			
	Full Sample		
	Sample Filter	Firms	Firm Obs
1	*Compustat*: 01/01/2018 to 05/31/2021	7553	21,389
2	After merging with *AuditAnalytics*	6199	16,926
3	Limiting to the Critical Audit Matter (CAM) period Report Date: 06/30/2019 to 05/31/2021	5770	11,740
4	After requiring non-missing values for covariates	5651	11,498
		5651	11,498
Panel B:			
	Covid Audit Reports by Accounting Estimate Type		Firm Obs
1	Significant Accounting Estimates		308
2	Low Estimation Uncertainty Accounting Estimates		3
3	Not Accounting Estimates		92
	Total Covid Audit Reports:		403
Panel C:			
	Covid Audit Reports by Accounting Topic		Firm Obs
1	Fair Value Accounting		322
2	Going Concern / Emphasis of Matter Opinion		63
3	Historical Cost Accounting		18
	Total Covid Audit Reports:		403
Panel D:			
SIC	Sample by SIC 1 digit industry	Firm Obs	Firm Percentage
1	Agriculture	34	0.30%
2	Mining	781	6.79%
3	Construction	2534	22.04%
4	Manufacturing	2089	18.17%
5	Transportation, Communications, Electric	1023	8.90%
6	Wholesale	599	5.21%
7	Retail	2422	21.06%
8	Finance	1495	13.00%
9	Services	395	3.44%
10	Public Administration	126	1.10%
	Total Covid Audit Reports:	11,498	100%

Table 1 presents the sample selection criteria and descriptive details of auditor's reports citing COVID-19 by both accounting topic and accounting estimate type.

The main dependent variable is *COVID REPORT*. Other covariates are measured as the accounting fundamentals scaled by total assets. *CASH* is the firm's cash and cash equivalents (CHE). *AR* is the firm's accounts receivables (RECT). *INVENTORY* is the firm's inventory (INVT). *PPE* is the firm's net property, plant, and equipment (PPENT). *INTANGIBLE* is the firm's intangible assets (INTAN) excluding goodwill (GDWL). *GOODWILL* is the firm's goodwill (GDWL). *AP* is the firm's accounts payable (AP). *DEFERRED REV* is the sum of firm's short-term (DRC) and long-term deferred revenue (DRLT). *DEBT* is the sum of firm's short-term (DLC) and long-term debt (DLTT). *RETAINED EARNINGS* is the firm's retained earnings (RE). *DIVIDENDS* is the firm's dividends (DVC). *COMMON STOCK* is the firm's common stock (CEQ). *REVENUES* is the firm's revenues (REV). *COS* is the firm's cost of sales (COGS). *SGA* is the firm's selling, general, and administrative (XSGA). *R&D* is the firm's research and development costs (XRD). *CAPEX* is the firm's capital

expenditures (CAPX). *ADVERTISING* is the firm's advertising costs (XAD). *NET INCOME* is the firm's income before extraordinary items (IB). *SPI* is the firm's special items (SPI). *CASH FLOWS* is the firm's cash flows from operating expenses (OANCF). We also include auditor-specific characteristics as outlined in Equation (2). The coefficients on *CASH*, *CASH FLOWS*, *INTANGIBLE*, and *GOODWILL* reflect the tests of our alternating hypotheses.

$$\begin{aligned} COVID\ REPORT_{it} = {} & \beta_0 + \beta_1 CASH_{it} + \beta_2 AR_{it} + \beta_3 INVENTORY_{it} + \beta_4 PPE_{it} + \beta_5 INTANGIBLE_{it} + \\ & \beta_6 GOODWILL_{it} + \beta_7 AP_{it} + \beta_8 DEFERRED\ REV_{it} + \beta_9 DEBT_{it} + \beta_{10} RETAINED\ EARNINGS_{it} + \beta_{11} DIVIDENDS_{it} + \\ & \beta_{12} COMMON\ STOCK_{it} + \beta_{13} REVENUES_{it} + \beta_{14} COS_{it} + \beta_{15} SGA_{it} + \beta_{16} R\&D_{it} + \beta_{17} CAPEX_{it} + \beta_{18} ADVERTISING_{it} \\ & + \beta_{19} NET\ INCOME_{it} + \beta_{20} SPI_{it} + \beta_{21} CASH\ FLOWS_{it} + \beta_{22} TENURE_{it} + \beta_{23} BIG4_{it} + \beta_{24} SPECIALIST_{it} \\ & + \beta_{25} AUD\ OFFICE\ SIZE_{it} + \lambda_i Industry\text{-}FE + \varepsilon_{it} \end{aligned} \quad (2)$$

The additional covariates in this model are *TENURE*, *BIG4*, *SPECIALIST*, and *AUD OFFICE SIZE*. *TENURE* is the number of years of the current client–auditor relationship. *BIG4* is an indicator variable equal to one if the firm engaged a Big4 auditor during the fiscal year, and 0 otherwise. *SPECIALIST*, an indicator variable equal to one if the auditor is the current market leader in the client firm's SIC2 digit industry during the year of the audit, and 0 otherwise, is also included in the model, as Stein (2019) demonstrates that firms with auditor industry specialization recognize more, larger, and more timely goodwill and intangible impairments.[6] *AUD OFFICE SIZE* is the proportion of yearly total audit office fees relative to the yearly total audit fees for the audit market, which captures the proportional size of the audit office to peers since larger audit offices provide higher audit quality (Francis et al., 2013). Also included in the model are industry fixed effects to control for time-invariant industry characteristics at the SIC2 digit industry level.[7]

3.2.2. Endogeneity

As a robustness check, we try to isolate general Covid and epidemic risk from the auditor's COVID-19 report, since the auditor's COVID-19-related report disclosures capture general Covid and epidemic risk. We utilize general Covid and epidemic risk measure developed by Hassan et al. (2023). This dataset creates a quantifiable measure that captures discussions by management during conference calls regarding firm-level exposure to COVID-19, SARS, and H1N1. We run a first-stage regression of our COVID-19 audit report measure on the Hassan et al. (2023) firm-year level metric with industry fixed effects. We save the residual from this regression, which captures the portion of the likelihood for a company to receive a COVID-19 audit report disclosure that is unrelated to their firm-level risk exposure to all epidemic diseases and utilize this variable in the reperformance of our main tests. Therefore, based on Equation (3), we regress *COVID_REPORT* on general *COVID-RISK* from Hassan et al. (2023) and obtain the residual, $COVID\text{-}RESIDUAL_{it}$, which captures the proportion of the COVID-19 report that is not explained by the general Covid and epidemic risk.

$$COVID\ REPORT_{it} = \alpha_0 + \alpha_1 COVID\text{-}RISK_{it} + \lambda_i Industry\text{-}FE + \varepsilon_{it} \quad (3)$$

By using $COVID\text{-}RESIDUAL_{it}$ as an alternative measure for the Covid Report, we re-estimate our results. In Equation (4), y_{it} is replaced with *ACCT ESTIMATE*, *SIG ACCT ESTIMATE*, *AUDIT FEES*, and *ABNORMAL AF*.

$$y_{it} = \beta_0 + \beta_1 COVID\text{-}RESIDUAL_{it} + \tau_{it} \quad (4)$$

Table 2 provides descriptive statistics for the full sample including firms not receiving COVID-19 mentions. We see that approximately 3.5% of the reports during the testing window mention COVID-19. For accounting estimate information, we merge all data

with *Audit Analytics* CAM issues and relate reports to matters reflecting accounting estimates. Unsurprisingly, given the PCAOB requirement that auditors mention in CAMs any challenging, subjective, or complex auditor judgment matter faced during the audit that was communicated or required to be communicated to the audit committee, auditors cite accounting estimates 82% of the time. The remaining covariates are scaled by total assets, which limits the deviations in distributions, and no variable measurements appear to warrant adjustment deeper investigation.

Table 2. Descriptive statistics.

	N	Mean	St.Dev	p25	Median	p75
COVID REPORT	11,498	0.035	0.184	0.000	0.000	0.000
ACCT ESTIMATE	11,498	0.822	0.881	0.000	1.000	2.000
SIG ACCT ESTIMATE	11,498	1.113	1.292	0.000	1.000	3.000
CASH	11,498	0.247	0.283	0.039	0.120	0.360
AR	11,498	0.158	0.207	0.023	0.082	0.186
INVENTORY	11,498	0.057	0.101	0.000	0.005	0.077
PPE	11,498	0.214	0.260	0.019	0.101	0.311
INTANGIBLE	11,498	0.061	0.109	0.000	0.008	0.075
GOODWILL	11,498	0.083	0.135	0.000	0.006	0.114
AP	11,498	0.171	0.388	0.016	0.043	0.113
DEFERRED REV	11,498	0.035	0.087	0.000	0.000	0.023
DEBT	11,498	0.403	0.895	0.059	0.239	0.448
RETAINED EARNINGS	11,498	−4.639	22.256	−0.968	−0.029	0.130
DIVIDENDS	11,498	0.010	0.025	0.000	0.000	0.009
COMMON STOCK	11,498	−0.029	2.519	0.127	0.369	0.605
REVENUES	11,498	0.560	0.632	0.082	0.367	0.791
COS	11,498	0.398	0.513	0.046	0.212	0.548
SGA	11,498	0.347	0.903	0.014	0.105	0.319
R&D	11,498	0.085	0.212	0.000	0.000	0.063
CAPEX	11,498	0.028	0.042	0.002	0.012	0.036
ADVERTISING	11,498	0.008	0.029	0.000	0.000	0.001
NET INCOME	11,498	−0.332	1.385	−0.168	0.004	0.039
SPI	11,498	−0.021	0.097	−0.011	−0.000	0.000
CASH FLOWS	11,498	−0.128	0.644	−0.074	0.032	0.093
TENURE	11,498	6.156	6.010	2.000	4.000	8.000
BIG4	11,498	0.626	0.484	0.000	1.000	1.000
SPECIALIST	11,498	0.155	0.362	0.000	0.000	0.000

Table 2 presents descriptive statistics of all independent and dependent variables for the sample. The t-statistics are reported in parentheses. The definitions for each variable are included in the appendix.

4. Empirical Results

Table 3 reports the univariate tests of the main dependent variables and the covariates across audit reports mentioning COVID-19 and the benchmark group. Overall, Panel A shows that COVID-19 reports are highly associated with accounting and significant accounting estimates as opposed to the benchmark group, and this difference is statistically significant at the 1% level. We see that firms receiving COVID-19 audit reports have considerably higher non-current assets, including intangibles and goodwill, in particular. Panel B shows that firms receiving COVID-19 mentions in their reports are associated with higher audit fees and abnormal audit fees. Other univariate tests provide inconsistent evidence about the differences between these two groups; firms receiving COVID-19 reports have less cash but higher accounts receivable, higher accounts payable but fewer expenses, and are more profitable. As such, we turn to multivariate regressions for further investigation.

Table 3. Univariate tests of control variables.

Panel A: Determinants & Accounting Estimate Models											
	Before Entropy Balancing							**After Entropy Balancing**			
	COVID REPORT		**NON-COVID REPORT**					**COVID REPORT**		**NON-COVID REPORT**	
	N	**Mean**	**N**	**Mean**	**Diff**	**t-Stat**		**Mean**	**Variance**	**Mean**	**Variance**
ACCT ESTIMATE	403	1.650	11,095	0.791	0.859	(19.55)	***				
SIG ACCT ESTIMATE	403	2.414	11,095	1.066	1.349	(20.95)	***				
CASH	403	0.142	11,095	0.251	−0.110	(−7.65)	***	0.142	0.027	0.142	0.036
AR	403	0.212	11,095	0.157	0.056	(5.30)	***	0.212	0.061	0.212	0.064
INVENTORY	403	0.057	11,095	0.058	−0.001	(−0.15)		0.057	0.009	0.057	0.012
PPE	403	0.216	11,095	0.214	0.001	(0.10)	*	0.216	0.064	0.216	0.073
INTANGIBLE	403	0.082	11,095	0.060	0.022	(3.85)	***	0.082	0.016	0.082	0.020
GOODWILL	403	0.107	11,095	0.083	0.024	(3.50)	***	0.107	0.021	0.107	0.025
AP	403	0.221	11,095	0.169	0.052	(2.65)	***	0.221	0.171	0.221	91.72
DEFERRED REV	403	0.026	11,095	0.036	−0.010	(−2.30)	**	0.026	0.004	0.026	0.005
DEBT	403	0.482	11,095	0.400	0.083	(1.80)	*	0.482	0.603	0.482	1.006
RETAINED EARNINGS	403	−1.723	11,095	−4.745	3.022	(2.70)	***	−1.723	126.1	−1.723	79.83
DIVIDENDS	403	0.008	11,095	0.011	−0.003	(−1.90)	*	0.008	0.000	0.008	0.000
COMMON STOCK	403	0.051	11,095	−0.033	0.083	(0.65)		0.051	2.733	0.051	3.185
REVENUES	403	0.590	11,095	0.559	0.031	(0.95)		0.590	0.595	0.590	0.910
COS	403	0.422	11,095	0.397	0.025	(0.95)		0.422	0.456	0.422	0.761
SGA	403	0.176	11,095	0.353	−0.177	(−3.85)	***	0.176	0.191	0.176	0.094
R&D	403	0.020	11,095	0.088	−0.068	(−6.25)	***	0.020	0.006	0.020	0.004
CAPEX	403	0.019	11,095	0.028	−0.009	(−4.35)	***	0.019	0.001	0.019	0.001
ADVERTISING	403	0.009	11,095	0.009	−0.000	(−0.00)		0.009	0.001	0.009	0.003
NET INCOME	403	−0.144	11,095	−0.340	0.196	(2.80)	***	−0.144	0.503	−0.144	0.378
SPI	403	−0.044	11,095	−0.020	−0.024	(−4.90)	***	−0.044	0.011	−0.044	0.019
CASH FLOWS	403	−0.003	11,095	−0.133	0.130	(4.00)	***	−0.003	0.082	−0.003	0.056
TENURE	403	6.250	11,095	6.152	0.099	(0.30)		6.250	43.13	6.250	40.15
BIG4	403	0.553	11,095	0.629	−0.075	(−3.10)	***	0.553	0.245	0.553	0.247
SPECIALIST	403	0.142	11,095	0.156	−0.014	(−0.75)		0.142	0.122	0.142	0.121
AUD OFFICE SIZE	403	0.005	11,095	0.004	0.000	(0.25)		0.004	0.000	0.004	0.000

Table 3. *Cont.*

Panel B: Audit Fees & Abnormal Audit Fees Models											
	Before Entropy Balancing							**After Entropy Balancing**			
	COVID REPORT		**NON-COVID REPORT**					**COVID REPORT**		**NON-COVID REPORT**	
	N	**Mean**	**N**	**Mean**	**Diff**	**t-Stat**		**Mean**	**Variance**	**Mean**	**Variance**
AUDIT FEES	403	14.09	11,095	13.65	0.431	(5.49)	***				
ABNORMAL AF	403	0.005	11,095	−0.005	−0.010	(0.27)					
SIZE	403	7.347	11,095	6.411	0.940	(6.25)	***	7.349	6.376	7.344	8.785
INVENTORY	403	0.057	11,095	0.059	−0.005	(−0.35)		0.057	0.009	0.057	0.012
AR	403	0.213	11,095	0.157	0.054	(5.25)	***	0.213	0.061	0.212	0.065
NET INCOME	403	−0.187	11,095	−2.483	2.29	(−0.55)		−0.186	2.192	−0.188	32.25
R&D	403	0.020	11,095	0.323	−0.302	(−0.50)		0.020	0.006	0.021	0.004
CAPEX	403	0.019	11,095	0.035	−0.016	(−0.80)		0.019	0.001	0.019	0.001
DEBT	403	0.483	11,095	0.482	0.001	(−1.80)	*	0.482	0.603	0.483	1.226
FOREIGN	403	0.224	11,095	0.239	−0.015	(−0.70)		0.223	0.174	0.223	0.173
SEGMENTS	403	1.960	11,095	1.496	0.465	(6.00)	***	1.955	3.217	1.954	3.385
MW	403	0.048	11,095	0.034	0.014	(1.45)		0.047	0.045	0.047	0.045
RESTATEMENT	403	0.007	11,095	0.084	−0.076	(−5.50)	***	0.007	0.007	0.007	0.007
BIG4	403	0.553	11,095	0.629	−0.075	(−3.10)	***	0.553	0.248	0.553	0.247
TENURE	403	6.250	11,095	6.152	0.099	(0.30)	***	6.345	43.13	6.343	39.04
SPECIALIST	403	0.142	11,095	0.156	−0.014	(−0.75)		0.141	0.122	0.141	0.121
AUD OFFICE SIZE	403	0.005	11,095	0.004	0.000	(0.25)		0.004	0.000	0.004	0.000
LN NAF	403	9.723	11,095	8.999	0.724	(2.75)	***	9.723	25.60	9.719	26.31
CLIENT IMPORT	403	0.231	11,095	0.258	−0.026	(−0.03)		0.231	0.091	0.231	0.095
BUSY	403	0.859	11,095	0.830	0.029	(0.02)		0.859	0.122	0.859	0.121

Table 3 presents univariate tests of covariates partitioned across firms receiving auditor reports citing COVID-19 and control firms not receiving auditor reports citing COVID-19. Panel A demonstrates these tests for all covariates in the determinants and accounting estimate models, while Panel B demonstrates these tests for all covariates in the audit fees and abnormal audit fee models, both before and after entropy balancing. The t-statistics are reported in parentheses. The definitions for each variable are included in the appendix. ***, **, and * denote significance levels of 1%, 5%, and 10%, respectively.

Table 4 presents the results of tests investigating the determinants of receiving a COVID-19 audit report. Turning to Column (1), we test our main empirical question using a logit regression where the main dependent variable, *COVID REPORT*, is equal to one when the audit report mentions COVID-19, and 0 otherwise. In this model, we control for the predominant and potentially relevant balance sheet, income statement, and cash flow items. Turning to the results, we see that high levels of intangibles and goodwill are associated with COVID-19 audit reports. We see similar results in Column (2), where we also include auditor-level factors. The statistically significant coefficients on *INTANGIBLES* and *GOODWILL, 0.036* and 0.044****, suggest a rejection of the null hypotheses 1c and 1d, while the lack of statistical significance for *CASH* and *CASH FLOWS* suggests that we cannot reject the null hypotheses in 1a and 1b. We interpret these results to mean that, of the accounting fundamentals, only long-term intangible assets and goodwill are predictive of receiving an audit report citing COVID-19. In terms of economic significance, the regression coefficient on *GOODWILL*, for example, indicates that a one unit increase in the ratio of goodwill to total assets increases the likelihood of the receiving a COVID-19-related audit disclosure in the audit report by approximately 1.1%.[8] Further, the negative and statistically significant coefficient of −0.012*** on the Big4 variables suggests that firms with Big4 auditors are less likely to receive a COVID-19 audit report. Given that firms with Big4 auditors are typically of higher quality (Lawrence et al., 2011), this result more likely suggests that firms of non-Big4 auditors are of generally lower quality or lower financial health and, as such, are more impacted by COVID-19.

Table 4. COVID-19 audit report prediction.

	(1) **COVID REPORT**	**(2)** **COVID REPORT**
CASH	−0.006	−0.007
	(−0.52)	(−0.57)
AR	−0.005	−0.008
	(−0.33)	(−0.48)
INVENTORY	0.008	0.003
	(0.33)	(0.15)
PPE	0.018	0.019
	(1.37)	(1.45)
INTANGIBLE	**0.039 ****	**0.036 ***
	(2.07)	**(1.89)**
GOODWILL	**0.037 ****	**0.044 ****
	(2.15)	**(2.54)**
AP	0.000	0.000
	(0.84)	(0.81)
DEFERRED REV	−0.002	−0.003
	(−0.39)	(−0.49)
DEBT	0.000	0.000
	(0.51)	(0.46)
RETAINED EARNINGS	0.001	0.001
	(0.34)	(0.38)
DIVIDENDS	−0.006	−0.006
	(−1.30)	(−1.28)

Table 4. *Cont.*

	(1) COVID REPORT	(2) COVID REPORT
COMMON STOCK	0.000	0.000
	(0.47)	(0.42)
REVENUES	0.003	0.003
	(0.99)	(0.98)
COS	0.000	0.000
	(0.20)	(0.10)
SGA	0.000	0.000
	(0.21)	(0.21)
R&D	0.000	0.000
	(0.34)	(0.41)
CAPEX	−0.016	−0.016
	(−1.45)	(−1.48)
ADVERTISING	−0.012	−0.011
	(−0.57)	(−0.54)
NET INCOME	0.000	0.000
	(0.21)	(0.21)
SPI	0.000	0.000
	(0.18)	(0.20)
CASH FLOWS	0.000	0.000
	(0.28)	(0.42)
TENURE		−0.000
		(−0.25)
BIG4		−0.012 ***
		(−2.83)
SPECIALIST		0.001
		(0.12)
AUD OFFICE SIZE		0.170
		(0.85)
CONSTANT	0.026 ***	0.033 ***
	(2.90)	(3.53)
Observations	11,498	11,498
Ind FE	YES	YES
Pseudo R-squared	0.019	0.019

The dependent variable is an indicator variable equal to one if the firm's audit report cited COVID-19. Table 4 presents the results of the logit regressions of *COVID REPORT* on firm fundamentals. The models are run using heteroskedasticity-robust standard errors. The t-statistics are reported in parentheses. The definitions for each variable are included in the appendix. ***, **, and * denote significance levels of 1%, 5%, and 10%, respectively.

In Table 5, we examine the association between COVID-19 audit reports with Types of Matters addressed in the audit report. In Column (1), the main dependent variable of interest is the variable *ACCT ESTIMATE*, which is an indicator variable equal to one if an audit report relates to an accounting estimate and zero otherwise. In Column (2), the main dependent variable of interest is the variable *SIG ACCT ESTIMATE*, which is a discrete, ordinal variable equal to 2 if the audit report mentions a significant accounting estimate, 1 if the audit report relates to an accounting estimate with low estimation on certainty, and zero otherwise. In both specifications, the main variable of interest, COVID-19 report, is positively associated with both accounting estimates and significant accounting estimates and this relationship is statistically significant at the 1% level.[9]

Table 5. Probit/ordered probit regressions of CAM content.

	(1) ACCT ESTIMATE	(2) SIG ACCT ESTIMATE
COVID REPORT	**1.316 *** **	**1.348 *** **
	(14.41)	**(18.73)**
CASH	−0.533 ***	−0.777 ***
	(−5.69)	(−9.07)
AR	−0.480 ***	−0.401 ***
	(−3.97)	(−3.66)
INVENTORY	−0.812 ***	−0.935 ***
	(−4.42)	(−5.58)
PPE	0.178 *	−0.144
	(1.67)	(−1.50)
INTANGIBLE	−0.468 ***	−0.342 ***
	(−3.23)	(−2.61)
GOODWILL	1.073 ***	0.889 ***
	(8.13)	(7.61)
AP	0.042 ***	0.026 **
	(4.00)	(2.12)
DEFERRED REV	−0.021	−0.142
	(−0.27)	(−1.45)
DEBT	0.006 **	0.012 ***
	(1.97)	(3.05)
RETAINED EARNINGS	0.703 **	0.320
	(2.52)	(1.37)
DIVIDENDS	0.004	0.010
	(0.10)	(0.27)
COMMON STOCK	0.001	0.005
	(0.34)	(1.49)
REVENUES	−0.021	−0.035
	(−0.63)	(−1.14)
COS	−0.044	−0.010
	(−1.46)	(−0.35)
SGA	−0.012	0.015
	(−1.02)	(1.22)
R&D	−0.247 ***	−0.198 ***
	(−4.55)	(−3.98)
CAPEX	−1.679 ***	−1.406 ***
	(−5.49)	(−4.53)
ADVERTISING	−0.341	−0.283
	(−1.59)	(−1.43)
NET INCOME	−0.013	0.014
	(−1.15)	(1.15)
SPI	−0.003	−0.034 **
	(−0.23)	(−2.53)
CASH FLOWS	0.058 ***	0.036 ***
	(4.34)	(3.02)
TENURE	0.029 ***	0.023 ***
	(12.85)	(12.48)
BIG4	0.916 ***	0.822 ***
	(29.32)	(28.37)
SPECIALIST	0.065 *	0.085 ***
	(1.71)	(2.60)
AUD OFFICE SIZE	0.674	0.017
	(0.48)	(0.01)
Observations	11,498	11,498
Ind FE	YES	YES
Pseudo R-squared	0.140	0.134

The dependent variables indicator variable or discrete ordinal variables equal to one (one or two) if the firm's audit report had critical audit matters relating to accounting estimates (significant accounting estimates). Table 4 presents the results of the logit regressions of *COVID REPORT* on firm fundamentals. The models are run using heteroskedasticity-robust standard errors. The t-statistics are reported in parentheses. The definitions for each variable are included in the appendix. ***, **, and * denote significance levels of 1%, 5%, and 10%, respectively.

In Table 6, we investigate whether the determinants of receiving a COVID-19 audit report relating to the sub-classifications of accounting topic are similar to or different from the likelihood of receiving a general COVID-19 audit report. We, therefore, separate

our COVID-19 audit report measure into those mentioning fair value accounting matters, going concern matters, and historical cost accounting matters, respectively. In determining expectations, we refer to the descriptive statistics in Table 1, which suggest that fair value accounting represents the largest classification of COVID-19 mentions. As such, the results of fair value accounting tests in Column (1) may show similar findings to Table 4. However, there could be fundamental differences in determinants for the other two accounting types. As such, we report the determinants of going concerns and historical cost accounting in Table 6 as well as in Columns (2) and (3), respectively. In these specifications, we see that goodwill continues to have a positive and significant relationship with receiving COVID-19 audit reports relating to fair value accounting matters and going concern matters. Other results from Column (2) are mixed. On one hand, contrary to expectations, cash on hand is predictive of receiving a COVID-19 going concern matter disclosure; however, in line with expectations, firms able to pay dividends are less likely to receive these same disclosures. Consistent with Table 4 results, firms with Big4 auditors are less likely to experience going concern matters since they are typically of higher quality (Lawrence et al., 2011).

We find no specific determinant for historical cost matters at the 5% statistical level. Overall, since COVID-19 reports related largely to fair value accounting, our evidence suggests that COVID-19 impacted firms with high levels of goodwill the most. This is consistent with the idea that the uncertainty around COVID-19 resulted in a triggering event for firms, meaning that they needed to perform qualitative or quantitative assessments of goodwill for potential impairment in accordance with FASB ASC 350 (i.e., impairment consideration). In the next table, we investigate the influence of these issues on the auditing costs for firms.

Recent literature suggests that CAMs provide information to investors (PCAOB, 2017; Christensen et al., 2014), which suggests that COVID-19 reports should provide new information to investors. Since literature suggests that disclosure helps reduce the cost of capital (Barth et al., 2013; Verrecchia, 1983), if the COVID-19 audit report disclosures present additional information, then investors are likely to incorporate this COVID-19 information into firm values (PCAOB, 2017). As such, one would expect differential market reactions following a *COVID REPORT* issuance. Given the disclosure literature, we might expect increased trading regardless of the sign of the information, as investors' perception of firm value reflects the true cost of capital values, and therefore, abnormal returns for firms with COVID-19-related audit report disclosures should be greater than benchmark firms. To perform this analysis, we estimate the daily expected returns from the market model, as outlined below, for each firm over the −300 to −46 period before the report issuance, where R_{it} is the daily stock market returns for firm i in time t and R_{mt} is the value weighted stock market return as defined in CRSP[10].

$$R_{it} = \beta_0 + \beta_1 R_{mt} + \varepsilon_{it} \quad (5)$$

After outlining these benchmark expected returns, we estimate the daily abnormal returns for each firm during the (−3, +3) period relative to the issuance date of the audit report.[11] Figure 1 presents the graphical analysis of these daily abnormal returns for firms with COVID-19 mentions and non-COVID report firms, which are enlightening. In this graph, the daily abnormal returns between the focal and control groups are relatively similar up until the issuance date of the audit report where *COVID REPORT* firms have a slight increase on the issuance date and then a 2-basis point increase on the day following audit report issuance. Meanwhile, the increase in daily abnormal return for the benchmark group of firms increases only approximately one tenth of one basis point, which suggests that audit reports mentioning COVID-19 provided considerably more information for investors. Interestingly, for *COVID REPORT* firms, there is a reversion in daily abnormal

returns in the two and three days following the audit report issuance, suggesting that as this COVID-19 information was incorporated into stock prices, the ability of investors to obtain *abnormal* returns declined. Overall, however, the daily abnormal returns are still considerably higher for these focal firms over the 3-day period than for those firms in the benchmark groups, even following incorporation of this information into investors' expectations of firm values.

Table 6. COVID-19 audit report content by accounting topic prediction.

	(1) COVID REPORT FAIR VALUE	(2) COVID REPORT GCO	(3) COVID REPORT HISTORICAL
CASH	−0.014	0.011 **	−0.003
	(−1.31)	(2.19)	(−1.26)
AR	−0.005	0.003	−0.006 *
	(−0.32)	(0.49)	(−1.77)
INVENTORY	−0.011	0.011	0.004
	(−0.54)	(1.17)	(0.73)
PPE	0.002	0.019 ***	−0.001
	(0.13)	(3.45)	(−0.26)
INTANGIBLE	0.021	0.020 ***	−0.005
	(1.24)	(2.59)	(−1.26)
GOODWILL	**0.031 ** **	**0.016 ** **	**−0.002**
	(1.96)	**(2.25)**	**(−0.62)**
AP	0.000	0.000	0.000
	(0.67)	(0.47)	(0.07)
DEFERRED REV	−0.002	−0.001	−0.000
	(−0.37)	(−0.32)	(−0.15)
DEBT	0.000	0.000	−0.000
	(0.36)	(0.38)	(−0.04)
RETAINED EARNINGS	0.000	0.000	0.000
	(0.20)	(0.42)	(0.14)
DIVIDENDS	−0.001	−0.005 ***	−0.000
	(−0.24)	(−2.61)	(−0.10)
COMMON STOCK	0.000	0.000	−0.000
	(0.32)	(0.36)	(−0.03)
REVENUES	−0.000	0.004 ***	−0.000
	(−0.16)	(2.92)	(−0.23)
COS	−0.000	0.001	0.000
	(−0.22)	(0.69)	(0.11)
SGA	0.000	0.000	0.000
	(0.17)	(0.14)	(0.03)
R&D	0.000	0.000	0.000
	(0.36)	(0.13)	(0.15)
CAPEX	−0.012	−0.004	−0.001
	(−1.21)	(−0.85)	(−0.22)
ADVERTISING	−0.009	−0.001	−0.001
	(−0.51)	(−0.14)	(−0.12)
NET INCOME	0.000	0.000	0.000
	(0.16)	(0.16)	(0.02)
SPI	0.000	0.000	0.000
	(0.08)	(0.30)	(0.06)
CASH FLOWS	0.000	−0.000	0.000
	(0.53)	(−0.25)	(0.20)
TENURE	−0.000	−0.000	0.000
	(−0.07)	(−0.94)	(0.87)
BIG4	0.000	−0.013 ***	0.001
	(0.11)	(−7.62)	(0.66)
SPECIALIST	0.000	0.003	−0.002 *
	(0.02)	(1.24)	(−1.83)
AUD OFFICE SIZE	0.147	0.025	−0.003
	(0.82)	(0.31)	(−0.07)
CONSTANT	0.029 ***	0.001	0.004 *
	(3.40)	(0.26)	(1.73)
Observations	11,497	11,497	11,497
Ind FE	YES	YES	YES
Pseudo R-squared	0.020	0.012	0.003

The dependent variable is an indicator variable equal to one if the firm's audit report cited COVID-19 and that citation related to a fair value accounting issue, going concern issue, or historical cost issue, respectively. Table 6 presents the results of the logit regressions of *COVID REPORT-FV* on firm fundamentals. The models are run using heteroskedasticity-robust standard errors. The t-statistics are reported in parentheses. The definitions for each variable are included in the appendix. ***, **, and * denote significance levels of 1%, 5%, and 10%, respectively.

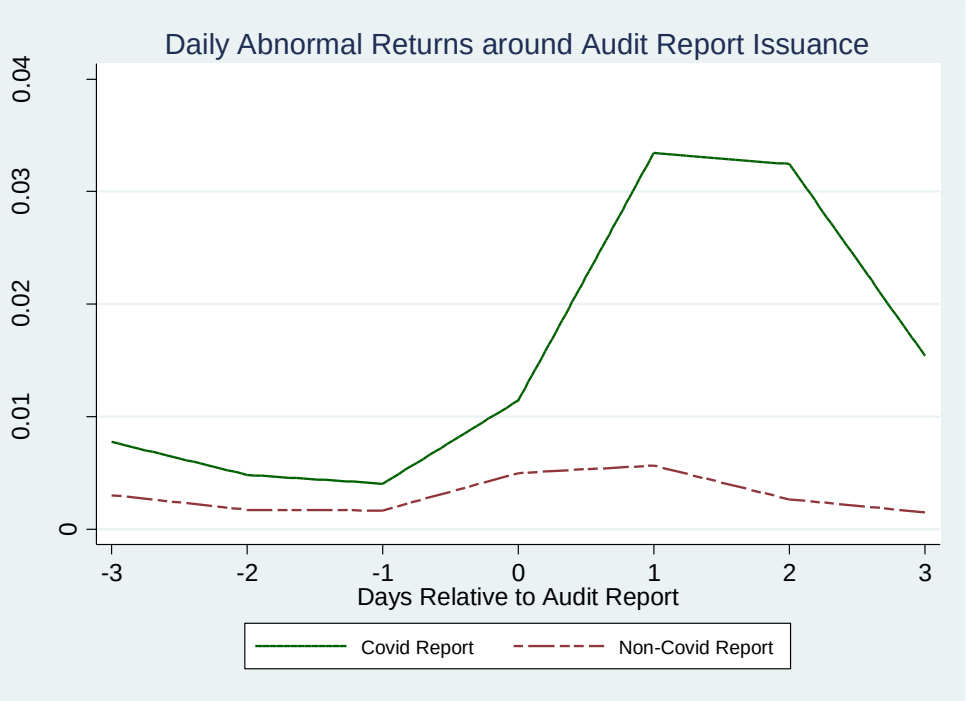


Figure 1. Daily abnormal returns around COVID-19 Reports and non-COVID-19 reports. Figure 1 illustrates the daily abnormal returns three days before and three days after the date of audit report issuance for firms with *Covid Reports* and *Non-Covid Reports*.

An important consideration for this study is whether these abnormal returns are significant. As such, we provide OLS regressions of these CARs on the key independent variable of interest, *COVID REPORT*, and controls, as described in Equation (4) below, to capture the extent to which abnormal returns for these focal firms are greater than those benchmark firms over the designated window. The control variables for the model represent those accounting fundamentals, capital market metrics, and other factors noted in recent event studies investigating auditing outcomes (Berglund, 2020; Kim & Klein, 2017).

$$CAR = \beta_0 + \beta_1 COVID\text{-}REPORT_{it} + \beta_2 SIZE_{it} + \beta_3 NET\ INCOME_{it} + \beta_4 DEBT_{it} + \beta_5 MCAP_{it} + \beta_6 MTB_{it} + \beta_7 NYSE_{it} + \beta_8 AMEX_{it} + \beta_9 NASDAQ_{it} + \beta_{10} Z\text{-}SCORE_{it} + \beta_{11} BIG4_{it} + \lambda_i Industry\text{-}FE + \varepsilon_{it} \quad (6)$$

Table 7 presents the regressions mirroring Figure 1 after controlling for company size, leverage, profitability, market-to-book, likelihood of bankruptcy, auditor quality, and exchange listing. In both panels, Column (1) relates to the pre-report issuance period (−3, −1), Column (2) relates to the date of the report issuance (0, 0), and Column (3) relates to the post-report issuance period (+1, +3). We find that CARs are indistinguishable between the focal and benchmark groups in the pre-issuance period and on the issuance date, but statistically significant at the 10% level in the post-issuance period, as demonstrated by the coefficient of 0.073 on *COVID REPORT*. For context, the coefficient on *COVID REPORT* in Model (3) suggests that focal firms have CARs that are 7.3 basis points higher than benchmark firms. Overall, these results support the idea that audit reports with COVID-19 mentions provide information useful to investors.

Table 7. Investor reactions around audit report issuances.

CAR	(1) (−3,−1) Pre	(2) (0,0) Filing Day	(3) (+1,+3) Post
COVID REPORT	**0.008**	**0.005**	**0.073 ***
	(0.27)	**(0.39)**	**(1.80)**
Controls	YES	YES	YES
Observations	4464	4464	4464
Ind FE	YES	YES	YES
Adjusted R-squared	0.019	0.003	0.003

The dependent variables are the Cumulative Abnormal Returns from the market model during the pre-report date period, the date of the report, or the post-report date period. This table presents the regression results of CARs on an indicator variable equal to one if the firm's audit report cited COVID-19. The models are run using heteroskedasticity-robust standard errors. The t-statistics are reported in parentheses. The definitions for each variable are included in the appendix. * denotes a significance level of 10%.

We further explore the relationship of abnormal returns around audit report issuances in Figures 2 and 3.[12] Figure 2 explores the cross-sectional variation in abnormal returns around audit report issuances for firms with *Covid Reports* and Non-Covid Reports contingent on financial statement performance. Panel A reports the average abnormal returns for firms reporting net income or net losses; Panel B reports the average abnormal returns for firms with clean or restated financial statements; and Panel C reports the average abnormal returns for firms with clean or going concerns. In all panels, consistent with the results of Figure 2, *COVID REPORT* firms with positive financial performance drive the abnormal returns following audit report issuances. For example, *COVID REPORT* firms that are not financially restated have daily abnormal returns that increase from 3 basis points to 11 basis points during the (0,+3) window.

We next investigate market reactions contingent on the content of the CAM disclosures. Figure 3 explores these cross-sectional variations in abnormal returns around audit report issuances for firms with *COVID REPORTS* and Non-Covid Reports. Panel A reports the cross-sectional variation of abnormal returns for firms with audit opinions citing no accounting estimates, accounting estimates with low estimation uncertainty, and significant accounting estimates; Panel B reports the cross-sectional variation of abnormal returns for firms with *COVID REPORTS* citing or not citing impairment considerations, and Non-Covid Reports; and Panel C reports the cross-sectional variation of abnormal returns for firms with *COVID REPORTS* citing fair value issues, *COVID REPORTS* not citing fair value issues, and Non-Covid Reports. Similarly consistent with the prior figures, *COVID REPORT* firms not addressing fair value or impairment considerations have the highest daily abnormal returns, reaching as high as 20 and 22.5 basis points in Panels B and C, respectively. Furthermore, Panel A results suggest that COVID-19 mentions provide information content, which is utilized by investors since firms with significant accounting estimate disclosures and non-accounting estimates have considerable positive (negative) abnormal returns. Panels B and C demonstrate that the abnormal returns are concentrated in firms when disclosures are more likely to present new information to investors.

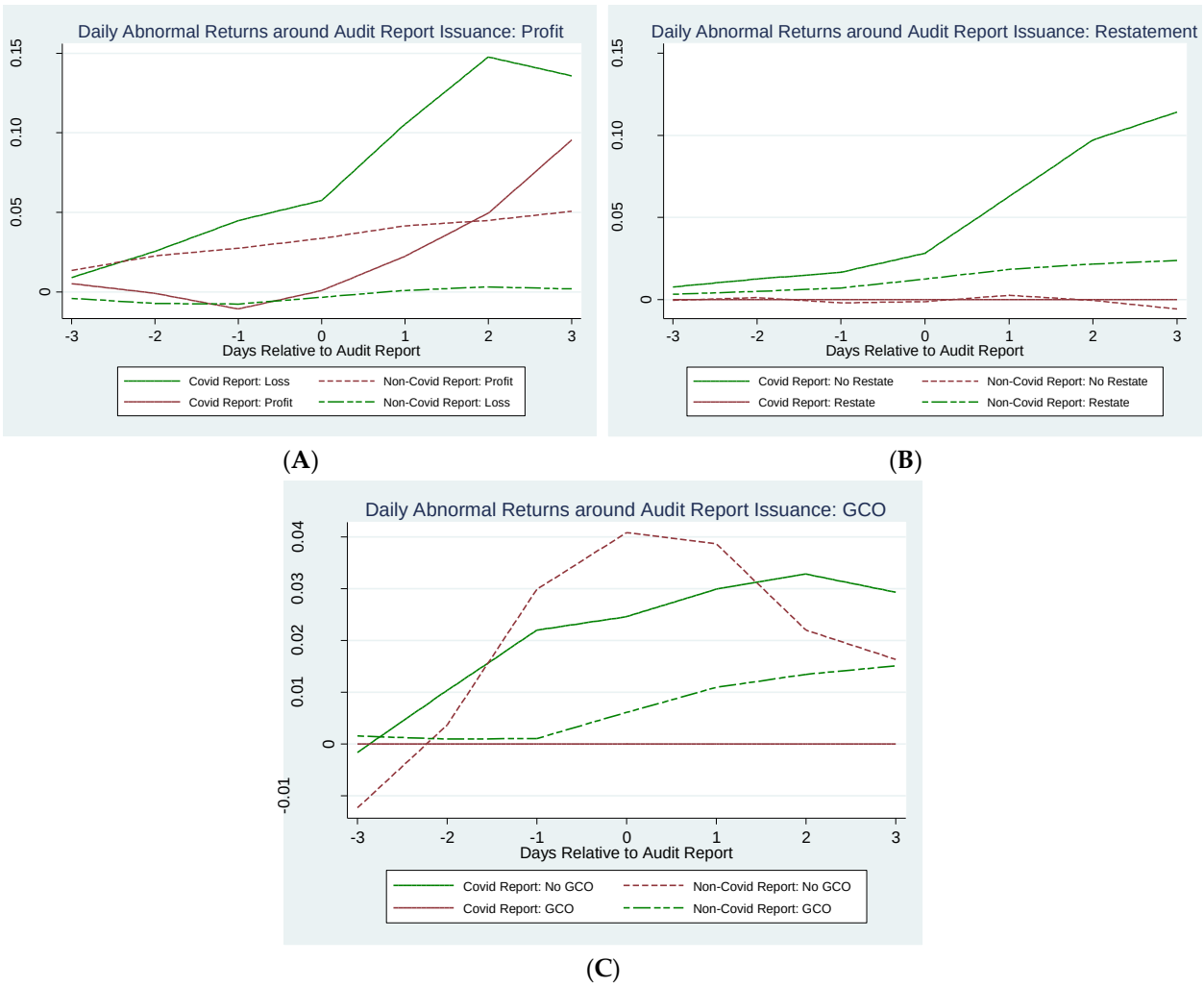


Figure 2. Cross-sectional variation around financial statement performance. Figure 2 illustrates the daily abnormal returns three days before and three days after the date of audit report issuance for firms with *Covid Reports* and *Non-Covid Reports*, contingent on financial statement performance. Panel (**A**) reports the cross-sectional variation of abnormal returns for firms reporting net income or net losses. Panel (**B**) reports the cross-sectional variation of abnormal returns for firms with clean or restated financial statements. Panel (**C**) reports the cross-sectional variation of abnormal returns for firms with clean or going concern opinions.

Table 8 investigates the subsequent economic effects to audit costs for firms impacted by COVID-19. Columns (1)–(3) investigate the association between firms receiving various COVID-19 audit reports and their audit fees, while Columns (4)–(6) investigate the association between firms receiving various COVID-19 audit reports and their abnormal audit fees. To adequately test this association, we utilize a modified version of well-accepted audit fee specifications (Guo et al., 2022; Blankley et al., 2012; Simunic, 1980) as follows:

$$\begin{aligned} \textit{Audit Fees} \text{ or } \textit{Abnormal Audit Fees} = {} & \beta_0 + \beta_X \textit{COVID-REPORT}_{it} + \beta_1 \textit{SIZE}_{it} \\ & + \beta_2 \textit{INVENTORY}_{it} + \beta_3 \textit{AR}_{it} + \beta_4 \textit{NET INCOME}_{it} + \beta_5 \textit{R\&D}_{it} + \beta_6 \textit{CAPEX}_{it} \\ & + \beta_7 \textit{DEBT}_{it} + \beta_8 \textit{FOREIGN}_{it} + \beta_9 \textit{SEGMENTS}_{it} + \beta_{10} \textit{MW}_{it} + \beta_{11} \textit{RESTATEMENT}_{it} \\ & + \beta_{12} \textit{BIG4}_{it} + \beta_{13} \textit{TENURE}_{it} + \beta_{14} \textit{SPECIALIST}_{it} + \beta_{15} \textit{AUD OFFICE SIZE}_{it} + \\ & \beta_{16} \textit{LN NAF}_{it} + \beta_{17} \textit{CLIENT IMPORT}_{it} + \beta_{18} \textit{BUSY}_{it} + \lambda_i \textit{Industry-FE} + \varepsilon_{it} \end{aligned} \quad (7)$$

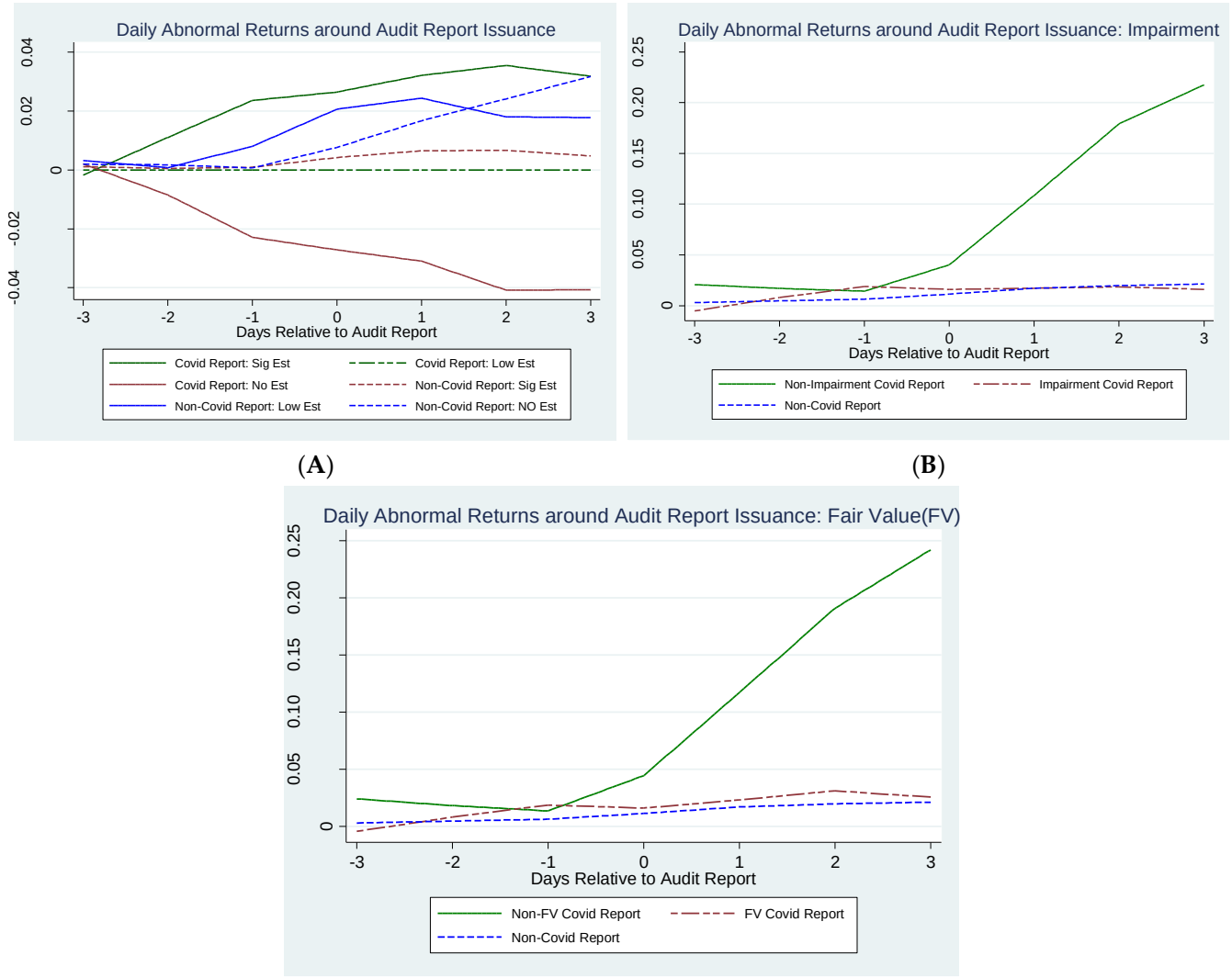


Figure 3. Cross-sectional variation around CAM content. Figure 3 illustrates the daily abnormal returns three days before and three days after the date of audit report issuance for firms with *Covid Reports* and *Non-Covid Reports*, contingent on critical audit matter content. Panel (**A**) reports the cross-sectional variation of abnormal returns for firms with audit opinions citing no accounting estimates, accounting estimate with low estimation uncertainty, and significant accounting estimates. Panel (**B**) reports the cross-sectional variation of abnormal returns for firms with *Covid Reports* citing or not citing impairment considerations, and *Non-Covid Reports*. Panel (**C**) reports the cross-sectional variation of abnormal returns for firms with *Covid Reports* citing fair value issues, *Covid Reports* not citing fair value issues, and *Non-Covid Reports*.

In Equation (7) above, $\beta_X COVID\text{-}REPORT_{it}$ represents a vector of possible indicator variables relating to receiving a COVID-19 audit report, dependent on the specification. We investigate this association across three levels of COVID-19 report content: *COVID REPORT*, *COVID REPORT—IMPAIRMENT*, *COVID REPORT—FV*, and *COVID REPORT—GCO*. Overall, the model controls for size, complexity, and risk (O'Keefe et al., 1994), profitability (*NET INCOME*), risk taking (*R&D*; *CAPEX*), which are the main demand side determinants, and for supply side, auditor-related variables such as audit quality outcomes (*MW*; *RESTATEMENT*), auditor quality (*BIG4*; *TENURE*; *SPECIALIST*; *AUD OFFICE SIZE*), auditor independence (*CLIENT IMPORT*), and engagement-specific qualities (*BUSY*). All variable definitions are included in the appendix. In Column (1), we first investigate

the association of receiving a COVID-19 report with audit fees. In Column (2), we test the association of receiving a COVID-19 report focused on asset impairments with audit fees. Finally, in Column (3), we further disaggregate the COVID-19 reports into fair value and GCO reports. The coefficient on *COVID REPORT* and Column (1) suggests that these firms are associated with 18.8% higher audit fees compared to those not receiving these COVID-19 audit reports.[13] In economic terms, this represents an association of USD 452,000 higher audit fees for these focal firms relative to Non-Covid report firms.[14] The results of Column (2) suggest that firms receiving COVID-19 reports relating to asset impairments are associated with 25.6%, or USD 673,000, higher audit fees relative to the firms not receiving a COVID-19 report and those receiving COVID-19 reports unrelated to asset impairments. The results in Column (3) suggest that both firms receiving COVID-19 reports relating to fair value matters and those relating to going concerns matters are associated with high audit fees as well. The 2.75 F-statistic demonstrates a statistical difference between these two coefficients, suggesting that while fair value-related COVID-19 reports require additional fees charged by the auditor, receiving a COVID-19 report about going concern issues requires even higher audit costs.

Table 8. COVID-19 audit report and auditor fees.

	(1) AUDIT FEES	(2) AUDIT FEES	(3) AUDIT FEES	(4) ABNORMAL AF	(5) ABNORMAL AF	(6) ABNORMAL AF
COVID REPORT	**0.172 *****			**0.081 *****		
	(5.05)			**(2.73)**		
COVID REPORT—IMPAIRMENT		**0.256 *****			**0.131 *****	
		(5.01)			**(2.93)**	
COVID REPORT—FV			**0.153 *****			**0.057 ***
			(4.02)			**(1.73)**
COVID REPORT—GCO			**0.305 *****			**0.205 *****
			(3.63)			**(2.80)**
F-test: $\beta_2 = \beta_3$			F = 2.75; p = 0.10			F = 3.41; p = 0.06
Controls	YES	YES	YES	YES	YES	YES
Observations	11,498	11,498	11,498	11,498	11,498	11,498
Ind FE	YES	YES	YES	YES	YES	YES
Adjusted R-squared	0.823	0.823	0.823	0.369	0.369	0.369

The dependent variable is the natural logarithmic transformation of audit fees and abnormal audit fees as defined in Blankley et al. (2012). Table 8 presents the results of the OLS regressions of audit fees on *COVID REPORT*, *COVID REPORT—IMPAIRMENT*, or *COVID REPORT—FV* & *COVID REPORT—GCO* and control variables. The models are run using heteroskedasticity-robust standard errors. The t-statistics are reported in parentheses. The definitions for each variable are included in the appendix. *** and * denote significance levels of 1% and 10%, respectively.

The results in Columns (4)–(6) largely support those in Columns (1)–(3). As discussed in the literature (Blankley et al., 2012), abnormal audit fees represent the audit fee premium extracted from the client beyond the normal amount necessary to perform the audit (Doogar et al., 2015; Hribar et al., 2014). Therefore, the abnormal audit fee dependent variable in Table 8 represents those audit costs once we remove the portion of audit costs typically necessary to perform the audit. Therefore, as expected, the magnitudes of the coefficients for these models are smaller than those for the audit fee models. For example, firms receiving COVID-19 audit reports are associated with approximately 8% higher abnormal audit fees. Overall, the results of Table 8 suggest that COVID-19 uncertainty had economic consequences for the audit process and for audit costs for those firms receiving COVID-19 audit reports.

5. Sensitivity Analyses and Discussion

5.1. Entropy Balancing

In Section 5, we investigate the sensitivity of our current analyses to specifications outside of the main research design. Table 9 demonstrates the results from these additional models when we utilize entropy balancing in an attempt to control for systematic differences in observables between firms receiving COVID-19 reports and those not receiving COVID-19 reports. We follow Hainmueller (2012) to reweight and balance all covariates in the accounting estimate or audit fee models, respectively, in the tests of Table 9.[15] After entropy balancing on the first and second moments, the means and variances are reweighted for each covariate between the focal and benchmark firm groups.[16] We utilize the standard, and we see that the results are consistent with the main findings. For example, the coefficient on *COVID REPORT* in the abnormal audit fee model decreases to 0.081*** from 0.082*** in Table 8, suggesting that differences in observable characteristics do not drive our main findings. Overall, this suggests that our main findings are not sensitive to pre-existing, systematic differences in these key determinants.

Table 9. Sensitivity analysis: entropy balancing.

	(1) ACCT ESTIMATE	(2) SIG ACCT ESTIMATE	(3) AUDIT FEES	(4) ABNORMAL AF
COVID REPORT	**0.784 *** (56.18)**	**1.215 *** (57.23)**	**0.154 *** (14.34)**	**0.082 *** (8.57)**
Accounting Estimate Controls	YES	YES		
Audit Fee Model Controls			YES	YES
Observations	11,498	11,498	11,498	11,498
Ind FE	YES	YES	YES	YES
Pseudo/Adjusted R-squared	0.374	0.378	0.875	0.368

By column, the dependent variables are an indicator variable equal to one if the firm's audit report had a critical audit matter relating to an accounting estimates, a discrete ordinal variable equal to one if the accounting estimate had a low level of estimation uncertainty and two if the estimate had a high level of estimation uncertainty, the natural logarithmic transformation of audit fees, and abnormal audit fees as defined in Blankley et al. (2012). Table 9 presents the results of the OLS regressions in Tables 5 and 8, reperformed after reweighting all covariates in the accounting estimates and audit fee models based on entropy balancing techniques of Hainmueller (2012). The models are run using heteroskedasticity-robust standard errors. The t-statistics are reported in parentheses. The definitions for each variable are included in the appendix. *** denotes a significance level of 1%.

5.2. General COVID-19 Risk and Endogeneity

Thus far, we have posited that COVID-19 audit reports empirically proxy the uncertainty imposed by COVID-19. However, one concern with this assumption is that the COVID-19 mention may effectively capture firm's direct economic risk due to epidemics rather than the imposed uncertainty. As such, we next investigate whether the COVID-19 mentions in the audit report are unique to the addressed matter or if the mention simply captures epidemic-related risks. We obtain data on epidemic risks used in Hassan et al. (2023) from Tarek Hassan's website, merge these data with our main sample, and reperform several tests in our data.[17] We first assess the relation of their measure with ours, finding a pairwise correlation coefficient of 0.091*** [untabulated], which suggests that though the two measures are statistically correlated, the low magnitude of the correlation coefficient suggests that the variables are not wholly overlapping due to the various channels through which COVID-19 impacted businesses.[18] Turning to determinants of Hassan et al. (2023) "Covid and Epidemic Risk" measure, high levels of current assets are predictors of COVID risk, while high levels of intangible assets and goodwill are not. This provides further evidence that our measures are capturing differential impacts to firms from COVID-19. Next, we attempt to isolate the COVID-19 mentions in the audit report from general pandemic risk by preparing a two-stage model, in Table 10, wherein we first regress our *COVID REPORT* metric on the Hassan et al. (2023) "Covid and Epidemic Risk"

measure, obtain the residuals, *COVID_RESIDUAL*, from the specification, and reperform the analyses of Table 4, Table 5, and Table 8 using this residual metric. Equations (3) and (4) show the first-stage and second-stage models, while Table 9 displays the results from the second-stage specifications.

Table 10. Endogeneity: analysis excluding general epidemic risk (Hassan et al., 2023).

	(1) 1st Stage	(2)	(3) 2nd Stage	(4)	
	COVID REPORT	**ACCT ESTIMATE**	**SIG ACCT ESTIMATE**	**AUDIT FEES**	**ABNORMAL AF**
COVID-RISK	**0.334 *** (3.88)**				
COVID_RESIDUAL		**0.338 *** (20.61)**	**0.334 *** (20.91)**	**0.039 *** (5.39)**	**0.019 *** (3.03)**
Determinants Model Controls	YES				
Accounting Estimate Controls		YES	YES		
Audit Fee Model Controls				YES	YES
Observations	11,034	11,034	11,034	11,034	11,034
Ind FE	YES	YES	YES	YES	YES
Adjusted / Pseudo R-squared	0.215	0.146	0.138	0.818	0.080

By column, the dependent variables are as follows: *COVID REPORT*, an indicator variable equal to one if the firm's audit report had a critical audit matter relating to an accounting estimates, a discrete ordinal variable equal to one if the accounting estimate had a low level of estimation uncertainty and two if the estimate had a high level of estimation uncertainty, the natural logarithmic transformation of audit fees, and abnormal audit fees as defined in Blankley et al. (2012). Table 10 presents the results of the OLS regressions in Table 4, Table 5, and Table 7, reperformed using *COVID_RESIDUAL*, which is the portion of *COVID REPORT* that is unrelated to general Covid Risk as measured by Hassan et al. (2023). The models are run using heteroskedasticity-robust standard errors. The t-statistics are reported in parentheses. The definitions for each variable are included in the appendix. *** denotes a significance level of 1%.

In Column (1), our results suggest that even after controlling for general epidemic risk in the first-stage model, high levels of goodwill are still highly predictive of receiving a COVID-19 auditor report. In Columns (2) through (4), we see further evidence that our main results are not driven by general COVID-19 risk as *COVID_RESIDUAL* is statistically significant at the 1% level. Also, our COVID-19 mentions are still likely to relate to significant accounting estimates and are associated with additional audit costs to the firm. Moreover, general epidemic risk does not drive our results, but instead provides further support that our COVID-19 measure relates to firm-specific accounting and auditing uncertainty.

5.3. Instrumental Variable Approach

We next perform an instrumental variable approach in an attempt to establish a causal link between receiving a *COVID REPORT* and the type of matter addressed by the COVID-19 mention as well as to the related audit and abnormal audit fees identified in this study. A necessary condition for the appropriate instrument is a correlation between the instrument and *COVID REPORT* and no association between the instrument and the dependent variables in the models. Therefore, an association in the test between the instrumented variable and the dependent variable are likely to exist exclusively through the association between the instrument and *COVID REPORT*.

We use county-level COVID-19 cases as an appropriate instrument for these tests. The number of COVID-19 cases in the county of a firm's headquarters is likely to indicate the extent to which firms' normal operations are likely to be impacted by COVID-19, thereby resulting in a COVID-19 mention in the audit report. For example, a firm located in an area with few COVID-19 cases is likely to have limited lockdown periods and fewer problems with staffing to meet normal operational demands. On the other hand, higher cases of COVID-19 are less likely to correlated to firm's specific audit fees since these fees are dependent on numerous firm factors less related to COVID-19 such as the prior year's fees, size, complexity, and leverage as well as auditor-related factors such as industry specialization, audit firm tier (e.g., BigN vs. non-BigN), and audit tenure.

To proxy for the level of COVID-19 cases, we utilize publicly available daily COVID-19 cases per U.S. county as reported by the New York Times (NYT).[19] In order to aggregate these daily data to a firm-year specific metric, we aggregate daily cases into a total monthly number of cases for each county, then prepare a rolling 6-month average of these total cases per county, defined as *COVID CASES*, and finally merge these data with our firm-year level audit report data via the year and month of the firm's report date.[20] We then take the logarithmic transformation of this average number of cases in order to reduce the influence of any large heterogeneity in this metric. We utilize two-stage least square regression (2SLS) to determine, in the first stage, whether *COVID REPORT* is correlated with our instrumented variable, *COVID CASES*. Table 11 Column (1) presents the correlation between *COVID REPORT* and *COVID CASES*, based on the coefficient on *COVID CASES* of 0.006*, when including industry and state fixed effects in the model to control for time-invariant industry and state factors.[21] Perhaps more importantly are the Durbin chi2 test statistics and Wu–Hausman F statistics, which demonstrate whether the instrumented variable is endogenous to the dependent variables in the second-stage regressions. The results of these untabulated test statistics demonstrate that our instrumental variable is exogenous to the dependent variables such as (abnormal) audit fees.[22] As such, our instrument meets the exclusion criteria in that the instrument should likely only impact the dependent variable through its correlation with *COVID REPORT*. Therefore, we turn to the remaining models presenting the results of the second-stage regressions. Table 11 demonstrates that our results are consistent with the main results of the paper even after utilizing our instrumental variable, $\hat{COVID\ REPORT}$.[23] The coefficient on $\hat{COVID\ REPORT}$ is positive and statistically significant at the 1% level. Taken together, this evidence is consistent with the idea that our main results are not driven by endogeneity.

Table 11. Endogeneity: instrumental variable approach.

	(1) 1st Stage	(2)	(3) 2nd Stage	(4)	(5)
	COVID REPORT	**ACCT ESTIMATE**	**SIG ACCT ESTIMATE**	**AUDIT FEES**	**ABNORMAL AF**
COVID CASES	**0.006 ***				
	(1.67)				
COVID ĤREPORT		**5.940 *****	**8.944 *****	**4.224 *****	**2.880 *****
		(3.93)	**(3.96)**	**(3.34)**	**(2.69)**
Accounting Estimate Controls		YES	YES		
Audit Fee Model Controls				YES	YES
Observations	4780	4803	4803	4803	4803
State FE	YES				
Ind FE	YES	YES	YES	YES	YES
Pseudo/Adjusted R-squared	0.054	0.219	0.222	0.828	0.350

By column, the dependent variables are as follows: *COVID REPORT*, an indicator variable equal to one if the firm's audit report had a critical audit matter relating to an accounting estimates, a discrete ordinal variable equal to one if the accounting estimate had a low level of estimation uncertainty and two if the estimate had a high level of estimation uncertainty, the natural logarithmic transformation of audit fees, and abnormal audit fees as defined in Blankley et al. (2012). Table 11 presents the results of instrumental variable regressions of Tables 5 and 8, reperformed using $\hat{COVID\ REPORT}$, which is the predicted value of the dependent variable from the regression of *COVID REPORT* on the logarithm transformation of the rolling 6-month average number of cases for the county in which firms are headquartered. The models are run using heteroskedasticity-robust standard errors. The t-statistics are reported in parentheses. The definitions for each variable are included in the appendix. *** and * denote significance levels of 1% and 10%, respectively.

5.4. Untabulated Results

Since our findings suggest that COVID-19 reports focus on asset impairments, particularly for goodwill, we test, in untabulated results, audit fees for firms receiving a COVID-19 audit report that explicitly state either a qualitative or quantitative assessment of non-

current assets was performed in order to demonstrate the impact COVID-19 impairment matters had on audit costs.[24] Given the economic uncertainty induced by COVID-19, firms who must progress to this "Quantitative" Step 2 need to have additional work on the client accounting side as well as the auditor side as the auditor verifies the inputs (e.g., industry growth rates; macroeconomic activity) and management calculations used to determine the asset impairment amount or lack of impairment, as necessary. Therefore, one might expect firms receiving a COVID-19 audit report mentioning Step 2 quantitative assessments to have greater audit fees, as verifying these assessments of fair value require greater auditor effort (Goncharov et al., 2013).

In untabulated results, we include two indicator variables relating to these asset impairment considerations based on manual review of the CAMs: *QUALITIATIVE*, which is an indicator variable equal to 1 if the auditor disclosure cites that a qualitative (Step 1) assessment was made of the non-current asset and 0 otherwise; *QUANTITATIVE*, which is an indicator variable equal to 1 if the auditor disclosure cites that a quantitative (Step 2) assessment was made of the non-current asset and 0 otherwise. When we include both variables in our audit fee model, we find that those firms needing to move onward to the quantitative Step 2 of impairment analysis have considerably higher audit fees than those that simply had to perform the step one qualitative assessments. This is in line with the expectation that Step 2 asset impairments require additional work by the auditor, which is priced into audit costs to the firm. Overall, this result further supports the idea that the uncertainty imposed by COVID-19 impacts managers' and auditors' assessments of long-term asset values and demonstrates the impact that this additional work has on audit costs. We perform a number of other analyses, which for brevity, we have not tabulated but that present consistent results: controlling for either auditor or year fixed effects in addition to industry fixed effects; preparing alternative measures of the main variables; limiting our tests to only those firms receiving at least one CAM; and controlling for the number of COVID-19 mentions in the 10-K filing.

5.5. Discussion

Overall, the breadth of results in this study suggest that companies with high intangible assets and goodwill were most likely to receive these COVID-19-related disclosures in the auditor's report, which we posit is due to the high degree of uncertainty regarding the long-term value of these assets and the high degree of uncertainty induced by COVID-19 (Altiga et al., 2020). In line with these results, we find the audit report disclosures citing COVID-19 had a higher likelihood of relating to significant accounting estimates such as impairment considerations for the long-term book value of intangible assets that are classified as accounting considerations with higher levels of uncertainty (Johnson & Wiley, 2019). Our results investigating the subsequent effects to corporate outsiders—investors and auditors—suggest that the COVID-19-related disclosures provided information to investors, resulting in abnormal stock returns for companies receiving these COVID-19-related audit disclosures. Since providing information content to stakeholders in the audit report was a key aim of the PCAOB AS 3101 (PCAOB, 2017), our study provides evidence consistent with the regulatory goal from the enactment of the CAM disclosure rules, despite some mixed literature investigating whether the disclosures provide information content (Burke et al., 2023; Christensen et al., 2014). We encourage future research to further investigate the different contexts in which, and to what extent, audit report disclosures can provide information content to outside stakeholders.

It is also important to highlight some limitations of our study. First, COVID-19 was a quickly emerging economic factor that is unlikely to have obvious economic impacts to the specific extent that an auditor would be obligated to mention COVID-19 in audit

report disclosures over a long time-series. Therefore, we are unfortunately unable to test our results over a long-term horizon and there exists the potential that this information, as disclosed in the audit report, might have become expected by outsiders, and thus, the information content of the disclosures may decrease over time. Second, one inherent limitation of our study, and most modern economics-based research, is that we cannot completely rule out endogeneity, and as such, our results may be biased or contingent upon some unobservable characteristic outside of the main hypothesized relationship in our study. We encourage future research to further investigate the conceptual underpinnings of our study in other contexts wherein audit report disclosures may provide information content to outside stakeholders.

6. Conclusions

The COVID-19 pandemic has been a once-in-a-century pandemic that has brought forth unprecedented uncertainty to firms' economic operations and their expected future cash flows, the full extent of which has not yet been fully investigated in the literature. In this paper, we attempt to contribute to a small but growing literature on the effects of COVID-19 on firms, particularly with regards to accounting implications and the subsequent reporting of their auditors. We identify firms receiving COVID-19 mentions in their audit reports and assess the determinants for firms to receive these COVID-19 auditor disclosures, finding that firms with high levels of goodwill and identifiable intangible assets are more likely to receive COVID-19 mentions in their reports. We also find that COVID-19 mentions focus on accounting estimates and significant accounting estimates as well as matters relating to fair value accounting and asset impairments. Tests of investor reactions suggest that these disclosures provided tradeable information, resulting in abnormal returns for focal firms. We further investigate the subsequent effects on firms' audit costs, finding that firms receiving COVID-19 mentions in their audit reports are associated with higher audit and abnormal audit costs. Firms needed to address long-term asset impairments using Step 2, quantitative, and impairments had considerably higher audit costs than those needed to evaluate under the more common qualitative impairment method. Overall, our findings suggest that COVID-19 represented a triggering event that caused companies to reassess the carrying value of their long-term assets under ASC Topic 350.

Author Contributions: Conceptualization, J.A.M.; methodology, J.A.M. and J.H.K.; software, J.A.M. and J.H.K.; validation, J.A.M. and J.H.K.; formal analysis, J.A.M. and J.H.K.; investigation, J.A.M. and J.H.K.; resources, J.A.M. and J.H.K.; data curation, J.A.M.; writing—original draft preparation, J.A.M.; writing—review and editing, J.A.M. and J.H.K.; visualization, J.A.M.; supervision, J.A.M. and J.H.K.; project administration, J.A.M. and J.H.K. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not Applicable.

Informed Consent Statement: Not Applicable.

Data Availability Statement: Data are available from the public sources cited in the text.

Conflicts of Interest: The authors declare no conflicts of interest.

Appendix A. Variable Definitions

Variable	Definition	Source
Key Variables		
COVID REPORT	An indicator variable equal to one when the firm's audit report mentions COVID-19, and 0 otherwise.	Auditor Reports
COVID REPORT—IMPAIRMENT	An indicator variable equal to one if the firm's audit report mentions COVID-19 and that citation relates to an asset impairment assessment.	Auditor Reports
COVID REPORT—FV	An indicator variable equal to one if the firm's audit report mentions COVID-19 and that citation related to a fair value accounting issue.	Auditor Reports
COVID REPORT—GCO	An indicator variable equal to one if the firm's audit report mentions COVID-19 and that citation related to a going concern issue.	Auditor Reports
ACCT ESTIMATE	An indicator variable equal to one if an audit report relates to an accounting estimate and zero otherwise.	Auditor Reports
SIG ACCT ESTIMATE	A discrete, ordinal variable equal to 2 if the audit report mentions a significant accounting estimate, 1 if the audit report relates to an accounting estimate with low estimation on certainty, and zero otherwise.	Auditor Reports
COVID-RISK	A firm-level measure of exposure to epidemic diseases including COVID-19, SARS, and H1N1 as calculated in Hassan et al. (2023)	Hassan et al. (2023)
COVID_RESIDUAL	The Residual from the equation: $COVID\ REPORT_{it} = \beta_0 + \beta_1 COVID\text{-}RISK_{it} + \lambda_i Industry\text{-}FE + \varepsilon$	Audit Reports/Hassan et al. (2023)
COVID CASES	The logarithm transformation of the rolling 6-month average number of cases for the county in which a firm is headquartered.	NYT COVID-19 Data
COVID $\hat{}$*REPORT*	The predicted value of the dependent variable from the equation: $COVID\ REPORT_{it} = \beta_0 + \beta_1 COVID\ CASES_{it} + \lambda i Industry\text{-}FE + \mu i State\text{-}FE + \varepsilon$	NYT COVID-19 Data
AUDIT FEES	The natural logarithmic transformation of audit fees for firm i in fiscal year t.	Audit Analytics
ABNORMAL AF	Abnormal audit fees as calculated by Blankley et al. (2012).	Blankley et al. (2012)
Control Variables		
ADVERTISING	Calculated as the firm's advertising costs (XAD) scaled by total assets (AT).	Compustat
AMEX	An indicator variable equal to one if the firm is traded in the American Stock Exchange, and 0 otherwise.	CRSP
AP	Calculated as the firm's accounts payable (AP) scaled by total assets (AT).	Compustat
AR	Calculated as the firm's accounts receivables (RECT) scaled by total assets (AT).	Compustat
AUD OFFICE SIZE	Calculated as the audit firm's office yearly audit fees scaled by total yearly audit fees for the audit market.	Audit Analytics
BIG4	An indicator variable equal to one if the firm engaged a Big4 auditor during the fiscal year, and 0 otherwise.	Audit Analytics
BUSY	An indicator variable equal to one if the firm's fiscal year end is in December of January, and 0 otherwise.	Compustat
CAPEX	Calculated as the firm's capital expenditures (CAPX) scaled by total assets (AT).	Compustat
CASH	Calculated as the firm's cash and cash equivalents (CHE) scaled by total assets (AT).	Compustat
CASH FLOWS	Calculated as the firm's cash flows from operating expenses (OANCF) scaled by total assets (AT).	Compustat
CLIENT IMPORT	Calculated as the sum of the client's audit fees and non-audit fees scaled by total yearly audit fees for the auditor.	Audit Analytics
COS	Calculated as the firm's cost of sales (COGS) scaled by total assets (AT).	Compustat
COMMON STOCK	Calculated as the firm's common stock (CEQ) scaled by total assets (AT).	Compustat
DEBT	Calculated as the sum of firm's short-term (DLC) and long-term debt (DLTT) scaled by total assets (AT).	Compustat
DEFERRED REV	Calculated as the sum of firm's short-term (DRC) and long-term deferred revenue (DRLT) scaled by total assets (AT).	Compustat
DIVIDENDS	Calculated as the firm's dividends (DVC) scaled by total assets (AT).	Compustat
FOREIGN	An indicator variable equal to 1 if firm i has any foreign operations, and 0 otherwise.	Compustat
GOODWILL	Calculated as the firm's goodwill (GDWL) scaled by total assets (AT).	Compustat
INTANGIBLE	Calculated as the firm's intangible assets (INTAN) excluding goodwill (GDWL) scaled by total assets (AT).	Compustat

Variable	Definition	Source
INVENTORY	Calculated as the firm's inventory (INVT) scaled by total assets (AT).	Compustat
LN NAF	The natural logarithmic transformation of non-audit fees for firm i in fiscal year t.	Audit Analytics
MCAP	Calculated as the firms stock price at fiscal year end (PRC) multiplied by number of shares outstanding at fiscal year end (SHROUT).	CRSP
MTB	Calculated as market capitalization of equity (MCAP) scaled by the book value of common equity (CEQ).	Compustat/CRSP
MW	An indicator variable equal to 1 if the client receives a material weakness opinion in the current year or the next year and 0 otherwise.	Audit Analytics
NASDAQ	An indicator variable equal to one if the firm is traded in the NASDAQ Stock Exchange, and 0 otherwise.	CRSP
NET INCOME	Calculated as the firm's income before extraordinary items (IB) scaled by total assets (AT).	Compustat
NYSE	An indicator variable equal to one if the firm is traded in the New York Stock Exchange, and 0 otherwise.	CRSP
POS_RETURNS	An indicator variable equal to one if the firm has a total postivie Cumulative Abnormal Return (CAR) during the (-3,3) day window.	CRSP
PPE	Calculated as the firm's net property, plant, and equipment (PPENT) scaled by total assets (AT).	Compustat
R&D	Calculated as the firm's research and development costs (XRD) scaled by total assets (AT).	Compustat
RESTATEMENT	An indicator variable equal to 1 if the firm receives a financial statement restatement during fiscal year t, and 0 otherwise.	Audit Analytics
RETAINED EARNINGS	Calculated as the firm's retained earnings (RE) scaled by total assets (AT).	Compustat
REVENUES	Calculated as the firm's revenues (REV) scaled by total assets (AT).	Compustat
SEGMENTS	Calculated as the logarithm of the number of business segments.	Compustat
SGA	Calculated as the firm's selling, general, and administrative (XSGA) scaled by total assets (AT).	Compustat
SIZE	Calculated as the logarithmic transformation of total assets (AT).	Compustat
SPECIALIST	An indicator variable equal to one if the auditor is the current market leader in the client firm's SIC2 digit industry during the year of the audit, and 0 otherwise.	Audit Analytics
SPI	Calculated as the firm's special items (SPI) scaled by total assets (AT).	Compustat
TENURE	The number of years of the current client-auditor relationship.	Audit Analytics
Z-SCORE	The likelihood of bankruptcy calculated per Altman (1968).	Altman (1968)

Appendix B. Examples of COVID-19 Audit Reports by Accounting Topic

Appendix B.1. Panel A: Audit Report Example—Fair Value Accounting

Company Name: Advanced Container Technologies, Inc. | CIK: 0001096950 | Report Date: 04/16/2021 | Audit Firm: Haskell & White LLP

Impairment Assessment for Goodwill and Intangible Assets – Refer to Notes 2 & 4 to the Consolidated Financial Statements

Critical Audit Matter Description

As reflected in the Company's consolidated financial statements, at December 31, 2020, the Company's goodwill was $1,020,314 and intangible assets were $1,324,870, excluding the distribution rights intangible asset acquired in 2020 as discussed below. As disclosed in Notes 2 and 4 to the consolidated financial statements, goodwill and intangible assets are tested for impairment at least annually or more frequently if indicators of impairment require the performance of an interim impairment assessment. As a result of these assessments, the Company concluded that there was no impairment to goodwill or the Company's intangible assets during the year ended December 31, 2020.

Auditing management's impairment tests of goodwill and intangible assets was complex and highly judgmental due to the significant measurement uncertainty in determining the fair values. In particular, the fair value estimates were sensitive to changes in significant assumptions such as discount rates, revenue growth rates, operating margins, estimated spend on capital expenditures, terminal growth rates and market multiples. These assumptions are affected by expected future market or economic conditions, including the impact of COVID-19.

How the Critical Audit Matter was Addressed in the Audit

We obtained an understanding of the relevant controls over the Company's goodwill and intangible assets and management's process to assess impairment. Additionally, we obtained a copy of an appraisal prepared by an independent valuation specialist obtained by management as part of their process to evaluate goodwill and intangible assets.

To test the fair values of the goodwill and intangible assets, our audit procedures included assessing valuation methodologies and testing the reasonableness of significant assumptions and underlying data used by the Company including forecasted revenue. We compared the significant assumptions used in the Company's long range plan, including forecasted revenue and operating margins, to current industry and economic trends, giving consideration to the impact of COVID-19, while also considering changes in the Company's business model, customer base and product mix. We assessed the historical accuracy of management's estimates by comparing past projections to actual performance and assessed sensitivity analyses of significant assumptions to evaluate the changes in the fair value of the goodwill and intangible assets resulting from changes in the assumptions. We evaluated management's reconciliation of the fair value of the reporting unit to the market capitalization of the Company and concurred with management that there was no impairment of goodwill or intangible assets as of the December 31, 2020 evaluation date.

Appendix B.2. Panel B: Audit Report Example—Going Concern Opinion

Company Name: Interpace Biosciences, Inc. | CIK: 0001054102 | Report Date: 04/01/2021 | Audit Firm: BDO USA, LLP

Opinion on the Consolidated Financial Statements

We have audited the accompanying consolidated balance sheets of Interpace Biosciences, Inc. and Subsidiaries (the "Company") as of December 31, 2020 and 2019, the related consolidated statements of operations, stockholders' equity, and cash flows for each of the two years in the period ended December 31, 2020, and the related notes and schedules (collectively referred to as the "consolidated financial statements"). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company at December 31, 2020 and 2019, and the results of its operations and its cash flows for each of the two years in the period ended December 31, 2020, in conformity with accounting principles generally accepted in the United States of America.

Going Concern Uncertainty

The accompanying consolidated financial statements have been prepared assuming that the Company will continue as a going concern. As discussed in Note 4 to the consolidated financial statements, the Company has suffered operating losses, has negative operating cash flows and is dependent upon its ability to generate profitable operations in the future and/or obtain additional financing to meet its obligations and repay its liabilities arising from normal business operations when they come due. In addition, the Company has been materially impacted by the outbreak of a novel coronavirus (COVID-19), which was declared a global pandemic by the World Health Organization in March 2020. These conditions raise substantial doubt about its ability to continue as a going concern. Management's plans in regard to these matters are also described in Note 4. The consolidated financial statements do not include any adjustments that might result from the outcome of this uncertainty.

Basis for Opinion

These consolidated financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's consolidated financial statements based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) ("PCAOB") and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud. The Company is not required to have, nor were we engaged to perform, an audit of its internal control over financial reporting. As part of our audits we are required to obtain an understanding of internal control over financial reporting but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control over financial reporting. Accordingly, we express no such opinion.

Our audits included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. We believe that our audits provide a reasonable basis for our opinion.

Appendix B.3. Panel C: Audit Report Example—Historical Cost Accounting

Company Name: Signet Jewelers Limited | CIK: 000832988 | Report Date: 04/01/2021 | Audit Firm: KPMG LLP

Evaluation of revenue recognition related to extended service plans

As discussed in Note 3 to the consolidated financial statements, revenue related to the extended service plans ("ESP") is recognized in proportion to when the expected costs will be incurred. To determine the amount of revenue to recognize, the Company estimates the deferral period and pattern of future claims costs. As a result of the COVID-19 pandemic, the recognition of ESP revenue was impacted by the temporary closing and subsequent reopening of stores in fiscal 2021.

We identified the evaluation of revenue recognition related to ESP as a critical audit matter. Subjective auditor judgment was required to evaluate the estimated deferral period and patterns of future claims costs used to recognize ESP revenue because a change in these estimates could substantially impact revenues, which included assessing the aging of claims by year of contract sale and estimates of future claims.

The following are the primary procedures we performed to address this critical audit matter. We evaluated the design and tested the operating effectiveness of certain internal controls related to the Company's revenue recognition process, including controls related to the development of assumptions used to estimate the deferral period and patterns of future claims costs. We evaluated the historical claim trends used by the Company in estimating the future claims costs on a sample basis by selecting claims and tracing them back to the original proof of sale. We tested the Company's assumption related to the deferral period in which the claims are expected to be incurred by comparing it to the current aging of claim costs incurred by year of contract sale, including estimated future claims. We tested the Company's assumption that historical claim trends are representative of future claims costs by comparing the pattern and volume of claims incurred from recent claims history to the current pattern in use and volume of claims incurred. We assessed the calculations used by the Company to determine ESP revenue recognized for consistency with the estimated deferral period and patterns of future claim costs.

Appendix C. Accounting and Significant Accounting Estimates Detailed by Topic Issue

Listed below is the level of accounting or significant accounting estimates by COVID-19 audit reports topic issues as defined by Johnson and Wiley (2019).

Low Accounting Estimates	*Significant Accounting Estimates*
Allowance for Doubtful Accounts	Acquisitions/Business Combinations
Depreciation Expense	Contingent Liabilities
Non-impairment related Fair Value Measurement	Financial Derivatives
Inventory Obsolescence	Going Concern/Liquidity Concerns
Minor Litigation	Goodwill
Nonmonetary Exchange	Intangible Assets
Retirement Benefits	Investments
Securities Valuation	Provision for Loan Losses
Valuation	Revenue Recognition
Warranties	Share/Stock-Based Compensation
	Tax Uncertainty

Notes

1 See Bauer et al. (2021) for a review of research questions covering the potential impacts of the COVID-19 pandemic on auditors' group judgment and decision making (JDM).

2 They find that the use of these public health measures reduced disease transmission in the short run and produced better economic outcomes in the medium run.

3 https://www.thecaq.org/profession-in-focus-a-conversation-with-sec-chief-accountant-sagar-teotia-during-covid-19/?utm_source=mnl:cpald&utm_medium=email&utm_campaign=26Jun2020, accessed on 1 May 2021.

4 After investigating all CAMS, we note that the first reference to Covid-19 in the audit report occurs in December 2019. We note that if we begin the sample during this time, our results are consistent without the approximate ~700 observations reported from July through November.

5 Appendix C outlines the accounting and significant accounting estimates detailed by topic issue.

6 Results are largely similar if we defined industry specialization as the proportion of the auditor's market share in the SIC2 digit industry based on audit fees.

7 The lambda in Equation (1) refers to the vector of beta coefficients, which from tautology in the auditing literature are omitted in the presentation of the results.

8 To assess this marginal effect we refer to the relatively simplistic division rule of Gelman and Hill (2007).

9 For brevity, we exclude the *CONSTANT CUT 1*, *CONSTANT CUT 2*, and *CONSTANT CUT 3* variables, which represent the multiple constants generated as part of the ordered probit model.

10 We utilize all available daily returns data during this period and require 3 consecutive days of trading, which reduces the sample size, but results are consistent if we don't utilize this restriction.

11 Cumulative abnormal returns are then calculated by summing the β_0 for each time t over the relevant window.

12 Due to sample size limitations for some financial performance metrics such as restatements and GCOs, we are not able to effectively test the statistical significance of these in regression models.

13 This amount is calculated as the 17.2% of logged audit fees: EXP(0.172) – 1.

14 This economic magnitude is calculated as 0.172 * $2,627,108 mean audit fees for the sample, rounded to the nearest thousand dollars.

15 Results are also consistent if we only entropy balance in the key determinants of receiving a *COVID REPORT*: *INTANGIBLE*, *GOODWILL*, and *BIG4*.

16 See Table 3, Panel A and Panel B for descriptive statistics around the reweighting of covariates before and after entropy balancing.

17 Using the number of COVID-19 and other epidemic risks mentioned in firms' quarterly earnings conference call and other textual classifications, Hassan et al. (2023) measure firms' specific risk to epidemics and the channel through which these risks occur (e.g., supply and demand impacts, costs reductions, etc.).

18 In untabulated results, we note that when we reperform the main tests of our paper, Hassan et al. "Covid Risk" measure is not statistically related to receiving any auditor disclosure in the audit report, but it is a predictor of receiving a COVID-19 audit report.

19 This data can be downloaded via the NYT's GitHub page: https://github.com/nytimes/covid-19-data (accessed on 25 December 2024).

20 We utilize a 6-month rolling average (as opposed to a 12-month) in order to have sufficient data for firms with audit reports dated from September 2020 through February 2021. The NYT only began collecting data as of March 2020 so a restriction of 12-months of data would reduce our testing sample nearly in half. Results are qualitatively and oftern times quantitatively significant after the reduction in sample size if we were to require a full 12 motnhs of data.

21 Other important test statistics are those of the Durbin chi2 tests and Wu-Hausman F statistics, which demonstrate whether the dependent variable is endogenous. For example, the results of the first stage regression, when audit fees is used as the dependent variable for the 2nd stage regression, demonstrates that *COVID CASES* present a correlated instrument with *COVID* REPORT.

[22] For example, when using audit fees as the dependent variable for the 2nd stage regression, the p-values of 0.04 and 0.00 for the Durbin chi2 test statistic and the Wu-Hausman F-statistic, respectively, indicate no endogenous regressors.

[23] Note that the number of observations in these regressions are considerably lower than those in the main results as, by design, all observations in the pre-COVID era (NY Times data collection begins in March 2020) drop from the regression as do those observations for firms in counties with missing values of COVID-19 cases in the NYT data.

[24] To fully understand these tests, it is important to highlight the necessary steps needed by management to assess whether long-term assets have been impaired. The FASB's guidance in ASU 2017-04 Intangibles—Goodwill and Other (Topic 350), demonstrates that management must annually perform a qualitative assessment of asset impairment and if it is more likely than not that the fair value of the reporting unit in which the asset is maintained is less than the carrying value then managers need to perform a Step 2 quantitative assessment, where they actually calculate this fair value amount and check for impairment.

References

Altiga, D., Baker, S., Barrero, J. M., Bloom, N., Bunn, P., Chen, S., Davis, S. J., Leather, J., Meyer, B., Mihaylov, E., Mizen, P., Parker, N., Renault, T., Smietanka, P., & Thwaites, G. (2020). Economic uncertainty before and during the COVID-19 pandemic. *Journal of Public Economics*, *191*, 104274. [CrossRef] [PubMed]

Altman, E. I. (1968). Financial ratios, discriminant analysis and prediction of. *The Journal of Finance*, *23*, 589–609. [CrossRef]

American Institute of CPAs [AICPA]. (2003). *Auditing fair value measurements and disclosures.* A.U. Section 328. Available online: https://pcaobus.org/oversight/standards/archived-standards/pre-reorganized-auditing-standards-interpretations/details/AU328 (accessed on 25 September 2024).

American Institute of CPAs [AICPA]. (2014). *Guide to intangible asset valuation: Accounting and financial reporting* (R. P. Schweihs, & R. F. Reilly, Eds.). American Institute of CPAs (AICPA).

American Institute of CPAs [AICPA]. (2020). *How to audit during a pandemic? You asked. We answered. AICPA Insights Blog*. Available online: https://www.primeglobal.net/news/how-to-audit-during-a-pandemic-aicpa (accessed on 25 September 2024).

Backof, A., Bowlin, K., & Goodson, B. (2014). The importance of clarification of auditors' responsibilities under the new audit reporting standards. *Contemporary Accounting Research*, *39*(4), 2284–2304. [CrossRef]

Baker, S. R., Bloom, N., & Davis, S. J. (2016). Measuring economic policy uncertainty. *The Quarterly Journal of Economics*, *131*(4), 1593–1636. [CrossRef]

Barth, M. E., Konchitchki, Y., & Landsman, W. R. (2013). Cost of capital and earnings transparency. *Journal of Accounting and Economics*, *55*, 206–224. [CrossRef]

Bauer, T. D., Humphreys, K. A., & Trotman, K. T. (2021). Group judgment and decision making in auditing: Research in the time of COVID-19 and beyond. *AUDITING: A Journal of Practice & Theory*. *forthcoming*.

Berglund, N. R. (2020). Do client bankruptcies preceded by clean audit opinions damage auditor reputation? *Contemporary Accounting Research*, *37*(3), 1914–1951. [CrossRef]

Blankley, A. I., Hurtt, D. N., & MacGregor, J. E. (2012). Abnormal audit fees and restatements. *Auditing: A Journal of Practice & Theory*, *31*(1), 79–96.

Bloomberg Law. (2022, March 31). *Why supply chains are entering third year of chaos: Quick take.* Available online: https://news.bloomberglaw.com/international-trade/why-supply-chains-are-entering-third-year-of-chaos-quicktake (accessed on 25 September 2024).

Brasel, K., Doxey, M. M., Grenier, J. H., & Reffett, A. (2016). Risk disclosure preceding negative outcomes: The effects of reporting critical audit matters on judgments of auditor liability. *The Accounting Review*, *91*(5), 1345–1362. [CrossRef]

Bukhari, Q., & Jameel, Y. (2020). *Will coronavirus pandemic diminish by summer?* SSRN Working Paper. Available online: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3556998 (accessed on 25 September 2024).

Burke, J. J., Hoitash, R., Hoitash, U., & Xiao, S. (2023). The disclosure and consequences of U.S. critical audit matters. *The Accounting Review*, *98*(2), 59–095. [CrossRef]

Caggiano, G., Castelnuovo, E., & Kima, R. (2020). The global effects of COVID-19-induced uncertainty. *Economic Letters*, *194*, 109392. [CrossRef] [PubMed]

Christensen, B. E., Glover, S. M., & Wolfe, C. J. (2014). Do critical audit matter paragraphs in the audit report change nonprofessional investors' decision to invest? *Auditing: A Journal of Practice & Theory*, *33*(4), 71–93.

Correia, S., Luck, S., & Verner, E. (2020). *Pandemics depress the economy, public health interventions do not: Evidence from the 1918 Flu.* SSRN Working Paper. Available online: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3561560 (accessed on 25 September 2024).

Cutler, D. M., & Summers, L. H. (2020). The COVID-19 pandemic and the $16 trillion virus. *The Journal of the American Medical Association*, *324*(15), 1495–1496. [CrossRef]

Deloitte. (2020). *Financial reporting considerations related to COVID-19 and an economic downturn*. Financial Reporting Alert 20-2. Deloitte.

Disparte, D. (2021, February 16). *Preparing for the next pandemic: Early lessons from COVID-19.* Brookings Institution. Available online: https://www.brookings.edu/research/preparing-for-the-next-pandemic-early-lessons-from-covid-19/ (accessed on 15 May 2021).

Doogar, R., Sivadasan, P., & Solomon, I. (2015). Audit fee residuals, costs or rents? *Review of Accounting Studies*, *20*, 1247–1286. [CrossRef]

Financial Accounting Standards Board [FASB]. (2014). *Presentation of financial statements—Going concern (subtopic 205-40)*. Financial Accounting Standards Board (FASB).

Francis, J. R., Michas, P. N., & Yu, M. (2013). Office size of Big 4 auditors and client restatements. *Contemporary Accounting Research*, *30*(4), 1626–1661. [CrossRef]

Garcíaa, S., Gambetta, N., García-Benauc, M. A., & Orta-Pérezd, M. (2019). Understanding the determinants of the magnitude of entity-level risk and account-level risk key audit matters: The case of the United Kingdom. *The British Accounting Review*, *51*(3), 227–240. [CrossRef]

Gelman, A., & Hill, J. (2007). *Data analysis using regression and multilevel/hierarchical models* (1st ed.). Cambridge University Press.

Gimbar, C., Hansen, B., & Ozlanski, M. (2016). The effects of critical audit matter paragraphs and accounting standard precision on auditor liability. *The Accounting Review*. *forthcoming*. [CrossRef]

Goncharov, I., Riedl, E. J., & Sellhorn, T. (2013). Fair value and audit fees. *Review of Accounting Studies*, *19*, 210–241. [CrossRef]

Greenstone, M., & Nigam, V. (2020). *Does social distancing matter?* University of Chicago Working Paper No. 2020-26. University of Chicago.

Guo, F., Lisic, L. L., Pittman, J. A., Seidel, T. A., Zhou, M., & Zhou, Y. (2022). Fool me once, shame on you; fool me twice, shame on me, the impact of audit partners' first-hand experience with arthur andersen's demise on their style. *Contemporary Accounting Research*, *39*(3), 1986–2022. [CrossRef]

Hainmueller, J. (2012). Entropy balancing for causal effects: A multivariate reweighting method to produce balanced samples in observational studies. *Political Analysis*, *20*, 25–46. [CrossRef]

Harris, J. (2020). *The coronavirus epidemic curve is already flattening in new york city*. NBER Working Paper No. 26917. NBER.

Hassan, T. A., Hollander, S., Lent, L. V., Schwedeler, M., & Tahoun, A. (2023). Firm-level exposure to epidemic diseases: COVID-19, SARS, and H1N1. *The Review of Financial Studies*, *36*(12), 4919–4964. [CrossRef]

Hong, H., Kubik, J. D., Wang, N., Xu, X., & Yang, J. (2021). *Pandemics, vaccines and an earnings damage function*. National Bureau of Economic Research Working Paper Number 27829. National Bureau of Economic Research.

Hribar, P., Kravet, T., & Wilson, R. (2014). A new measure of accounting quality. *Review of Accounting Studies*, *19*, 506–538. [CrossRef]

Huikki, J., Mouritsen, J., & Silvola, H. (2017). Relative reliability and the recognisable firm: Calculating goodwill impairment value. *Accounting, Organizations, and Society*, *56*, 68–83. [CrossRef]

Johns Hopkins Coronavirus Resource Center. (2021, October 14). *COVID-19 dashboard*. Available online: https://www.scirp.org/reference/referencespapers?referenceid=3025590 (accessed on 1 December 2021).

Johnson, R. N., & Wiley, L. D. (2019). *Auditing: A practical approach with data analytics*. John Wiley & Sons.

Kachelmeier, S., Rimkus, D., Schmidt, J. J., & Valentine, K. (2020). The forewarning effect of critical audit matter disclosures involving measurement uncertainty. *Contemporary Accounting Research*, *37*(4), 2186–2212. [CrossRef]

Kim, S., & Klein, A. (2017). Did the 1999 NYSE and NASDAQ listing standard changes on audit committee composition benefit investors? *The Accounting Review*, *92*(6), 187–212. [CrossRef]

KPMG. (2019, December). *Fair value measurement: questions and answers*. Available online: https://assets.kpmg.com/content/dam/kpmg/be/pdf/2020/01/fair-value-qa-2019.pdf (accessed on 15 May 2021).

KPMG. (2020, December 3). *Are fair values appropriately determined and disclosed? What's the issue?* Available online: https://home.kpmg/xx/en/home/insights/2020/03/covid-19-assets-1b.html (accessed on 15 May 2021).

Lawrence, A., Minutti-Meza, M., & Zhang, P. (2011). Can Big 4 versus non-Big 4 differences in audit-quality proxies be attributed to client characteristics? *The Accounting Review*, *86*(1), 259–286. [CrossRef]

McKibbin, W., & Fernando, R. (2020). *The Global macroeconomic impacts of COVID-19: Seven scenarios*. Centre for Applied Macroeconomic Analysis (CAMA) Working Paper. CAMA.

Murphy, M. L. (2020, December). *Assessing audit risks during the pandemic.* Journal of Accountancy. Available online: https://www.journalofaccountancy.com/news/2020/dec/assess-audit-risks-during-coronavirus-pandemic.html (accessed on 12 May 2021).

New York Times [NYT]. (2021a, December 5). *How the supply chain crisis unfolded*. Available online: https://www.nytimes.com/interactive/2021/12/05/business/economy/supply-chain.html (accessed on 15 April 2022).

New York Times [NYT]. (2021b, October 14). *Tracking coronavirus in new york: Latest map and case count*. Available online: https://www.nytimes.com/interactive/2021/us/new-york-covid-cases.html (accessed on 15 April 2022).

New York Times [NYT]. (2022a, April 25). *COVID lockdowns revive the ghosts of a planned economy*. Available online: https://www.nytimes.com/2022/04/25/business/china-covid-zero-economy.html (accessed on 21 May 2022).

New York Times [NYT]. (2022b, May 16). *One million deaths. Coronavirus briefing newsletter*. Available online: https://www.nytimes.com/2022/05/16/briefing/one-million-deaths.html (accessed on 21 May 2022).

Noll, D. (2020, December 14). *4 A&A challenges caused by COVID-19. AICPA*. AICPA blog. Available online: https://nsacoop.org/articles/4-aa-challenges-caused-covid-19 (accessed on 15 May 2021).

O'Keefe, T. B., Simunic, D. A., & Stein, M. T. (1994). The production of audit services, evidence from a major public accounting firm. *Journal of Accounting Research*, *32*, 241–261. [CrossRef]

Ozili, P., & Arun, T. (2020). *Spillover of COVID-19: Impact on the global economy.* SSRN Working Paper. Available online: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3562570 (accessed on 15 May 2021).

Parmet, W. E., & Sinha, M. S. (2020). COVID-19—The Law and Limits of Quarantine. *The New England Journal of Medicine*, *382*(e28), 1–3. [CrossRef]

PCAOB. (2017). *AS 3101. The auditor's report on an audit of financial statements when the auditor expresses an unqualified opinion.* PCAOB Release No. 2017-001. Washington, DC, USA. Available online: https://pcaobus.org/Rulemaking/Docket034/2017-001-auditors-report-final-rule.pdf (accessed on 17 December 2022).

PCAOB. (2019, March 18). *Implementation of critical audit matters: The basics. staff guidance.* Washington, DC, USA. Available online: https://pcaobus.org/Standards/Documents/Implementation-of-Critical-Audit-Matters-The-Basics.pdf (accessed on 17 December 2022).

Radigan, J. (2021). *Pandemic still complicates going concern disclosures.* Journal of Accountancy. Available online: https://www.journalofaccountancy.com/news/2021/jun/coronavirus-pandemic-complicates-going-concern-disclosures.html?utm_source=mnl:cpald&utm_medium=email&utm_campaign=15Jun2021 (accessed on 23 August 2021).

Ramanna, K., & Watts, R. L. (2012). Evidence on the use of unverifiable estimates in required goodwill impairment. *Review of Accounting Studies*, *17*, 749–780. [CrossRef]

Sajadi, M. M., Habibzadeh, P., Vintzileos, A., Shokouhi, S., Miralles-Wilhelm, F., & Amoroso, A. (2020). *Temperature, humidity, and latitude analysis to predict potential spread and seasonality for COVID-19.* SSRN Working Paper. Available online: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3550308 (accessed on 23 August 2021).

Siegel, R. (2021). *What's in Congress's $1.9 trillion covid bill: Checks, unemployment insurance and more.* The Washington Post. Available online: https://www.washingtonpost.com/business/2021/03/10/what-is-in-the-stimulus/ (accessed on 22 August 2021).

Simunic, D. A. (1980). The pricing of audit services: Theory and evidence. *Journal of Accounting Research*, *18*, 161–190. [CrossRef]

Stein, S. (2019). Auditor industry specialization and accounting estimates: Evidence from asset impairments. *Auditing: A Journal of Practice & Theory*, *38*(2), 207–234.

Suljac, V. (2021). *Litigation risk, financial reporting quality, and critical audit matters in the audit report: Early, U.S. evidence.* SSRN Working Paper. Available online: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3771081 (accessed on 22 August 2021).

Szczygielski, J. J., Bwanya, P. R., Charteris, A., & Brzeszczynski, J. (2021). The only certainty is uncertainty: An analysis of the impact of COVID-19 uncertainty on regional stock markets. *Finance Research Letters. forthcoming*. [CrossRef] [PubMed]

Tysiac, K. (2021, December). *PCAOB changes 2021 inspection focus areas as a result of COVID-19.* Journal of Accountancy. Available online: https://www.journalofaccountancy.com/news/2020/dec/pcaob-changes-2021-inspection-focus-areas-result-of-coronavirus.html (accessed on 15 May 2022).

Verrecchia, R. E. (1983). Discretionary disclosure. *Journal of Accounting and Economics*, *5*, 179–194. [CrossRef]

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.