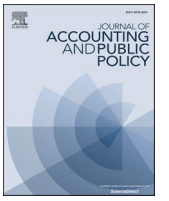
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Full length article



Audit materiality judgments during the COVID-19 pandemic: Evidence from the United Kingdom☆

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ABSTRACT

This study investigates how auditors' materiality assessments changed during the sudden adverse economic conditions caused by the COVID-19 pandemic. Our evidence suggests that auditors primarily adjusted their benchmark choices in response to the pandemic's negative impact, while maintaining quantitative materiality amounts similar to the pre-pandemic levels. Our further analysis reveals an asymmetric pattern in auditors' materiality judgments: declining performance is associated with a higher likelihood of changing materiality benchmark types, but not with significant reductions in materiality values. Conversely, strong performance is associated with increased materiality values, but not with changes in benchmark types. Such practices raise concerns about whether auditors may have used benchmark changes to avoid reducing materiality levels. Our study provides valuable insights for practitioners, policymakers, and academics on auditors' materiality assessments in the context of a global crisis.

> "(I)t is likely that overall materiality (during the pandemic) will be set at a lower level than previously for some audits, which could increase the scope and extent of testing needed."
> Institute of Chartered Accountants in England and Wales (ICAEW, 2020)

1. Introduction

This paper provides evidence on auditors' actual quantitative materiality assessment for a sample of the 350 largest UK firms from 2015 to 2022. Materiality assessment is a key component of the audit assurance process and one of the most critical cogwheels an

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auditor has to steer audit quality.[1] However, little is known regarding (1) whether and how auditors' materiality judgment responds to a major global crisis such as the COVID-19 pandemic, and (2) whether the implications of materiality assessment on audit outcomes differ during crises periods from normal times. In this study, we provide archival evidence on both questions.

The impact of the COVID-19 pandemic on auditors' materiality judgments is *ex ante* not clear. On the one hand, the risk of material misstatements is arguably higher during the Covid period. Factors such as heightened economic uncertainty and supply chain disruptions may complicate accounting forecasts and estimates, even for firms that experienced strong growth during the pandemic (Levy 2020). Further, the unprecedented nature of crisis situations can upend internal control systems, affecting fraud detection, risk assessment, and effective communication (Carter and Speklé, 2024). For audit firms, the pandemic necessitated the rapid adoption of remote working and new audit technologies, which posed challenges for the auditing practice and auditors' professional development; Covid restrictions also limited the accessibility to first-hand audit evidence and client personnel (Gong et al., 2022; Sian, 2024; Tighe, 2022). Investors may be particularly concerned about firms' financial health during the pandemic, and their scrutiny could also place greater pressure on auditors. Combined, these factors could call for lower levels of audit materiality for most companies. Supporting this notion, the ICAEW stated in its guidance titled "COVID-19: determining materiality" that "*(i)t is likely that overall materiality will be set at a lower level than previously for some audits, which could increase the scope and extent of testing needed*" and "*(a)uditors may need to spend more time on determining materiality than they might ordinarily, and some conservatism may be appropriate*" (ICAEW 2020).

On the other hand, the pandemic also presents significant challenges that may hinder audit firms from maintaining the ideal level of materiality strictness. According to ISA (UK) 320, lowering the materiality amount should lead to more rigorous audit procedures. However, in practice, cost constraints may discourage audit firms from adjusting materiality values downward to accommodate increased audit risk. This concern may be exacerbated during the pandemic due to limited resources (both financial and human resources) and travel restrictions. Additionally, client firms that are adversely impacted by the pandemic may not be able to bear the cost of a more extensive audit.

Our study attempts to answer the empirical question of how auditors' materiality judgment responds to the COVID-19 pandemic and its implications for audit outcomes. This is an important question because materiality assessment is essential for achieving reliable financial statements (Choudhary et al. 2019).[2] A few empirical studies have attempted to infer how auditors respond to macroeconomic shocks caused by the global financial crisis (GFC) by examining audit outcomes in this period (e.g., Alexeyeva and Svanström 2015; Doogar et al. 2015; Krishnan and Zhang 2014; Xu, Carson, Fargher, and Jiang 2013). For example, Doogar et al. (2015) find that audit fees positively relate to audit risks associated with bank loan and investment activities during 2006 and 2007. The authors interpret this as evidence that auditors recognize and respond to escalating audit risks by exerting more effort. However, it is difficult to distinguish whether and to what extent the variation in fees is due to labor usage or risk premium (Doogar et al. 2015). Overall, the existing literature offers limited insights into how economic crises impacts auditors' actual professional judgment and the overall audit process. In this study, we address this gap in the literature by investigating how auditors adjust their materiality judgments during the pandemic period.

We chose the UK setting because it allows us to understand the actual materiality assessment before and after the onset of the COVID-19 pandemic.[3] Data on auditors' materiality decisions is not readily available, and hence we hand-collected data from the auditors' reports of FTSE350 firms. We end up with 308 unique client-firms and 2,295 client-year observations. In our analysis, we mark the start of the COVID-19 pandemic, as declared by the WHO, as a key point to differentiate between two time periods: before and after the outbreak. The pre-COVID (hereafter referred to as "Pre") period includes the period from 2015 to February 2020. In contrast, the post-COVID (hereafter referred to as "Post") period includes the period from March 2020 to the end of 2022.

Our analysis proceeds in three steps. First, we provide descriptive evidence on the change in auditors' materiality assessments. Regarding the materiality benchmark type choice, we find that there are significant differences between the Pre- and Post-periods. Specifically, we find an apparent decrease (from 60 % to 50 %)[4] in the choice of Profit Before Tax (PBT)-related benchmarks, and an increase in the use of other benchmarks such as Asset- or Revenue-related benchmarks.

Following Choudhary et al. (2019), we also examine the frequency of quantitative materiality expressed as a percentage of PBT for subsamples in the Pre and Post periods. Consistent with Choudhary et al. (2019), we find that the assessed materiality values in the Pre period vary across clients and are highly concentrated at 5 % of PBT. In the Post period, however, the materiality amount is less concentrated at 5 % of PBT. This shift may be attributed to more professional judgments in the Post period and/or to the increased volatility of the PBT value. Taken together, our descriptive evidence suggests that auditors' approach to materiality assessment changed during the Post period.

[1] Auditors employ materiality assessments to focus on significant areas with higher risks of material misstatement, optimizing the efficiency of the audit process. These values guide the planning and execution of audits, ensuring resources are concentrated on the most impactful transactions and account balances. Materiality helps in evaluating whether the total of all misstatements could materially affect the financial statements, influencing the audit opinion. Additionally, it aids in determining the significance of errors to be communicated to management and governance bodies, based on their potential impact on the financial statements.

[2] Recent calls for public consultation for audit standard revision (e.g., IAASB 2022) indicate the importance of research on auditors' actual conduct.

[3] According to ISA (UK) 700, Forming an Opinion and Reporting on Financial Statements, auditors of public firms in the U.K. must disclose their materiality assessments in audit reports.

[4] The Pre-pandemic number is in line with the findings in Eilifsen and Messier (2015) and Quick et al. (2023), providing empirical evidence that profit before tax is the most commonly chosen benchmark.

Next, our univariate tests show that the probability of changing the benchmark type is significantly higher in the Post period than in the Pre period. However, materiality values in the Post period are larger, yet not significantly different from those in the Pre period. Looking at audit outcomes, we find that audit fees, audit delay, and the probability of receiving a going concern opinion are all higher in the Post period.

In the second part of our empirical study, we use regression analysis to examine two key aspects of materiality judgment: materiality benchmark choice and materiality value. Auditing standards (e.g., ISA (UK) 320) and regulatory bodies (e.g., ICAEW 2020, PCAOB 2012) emphasize the importance of benchmark selection, as inappropriate choices could lead to an overstatement of materiality and potentially reduce audit effort and impair audit quality. While there is no widespread evidence of systematic benchmark misuse, anecdotal evidence and academic research suggest that such practices may occur. Recent PCAOB inspection cases and the study by Hallman et al. (2022) provide evidence that auditors may manipulate benchmark choices to reduce audit work.[5] Similarly, Brody et al. (2003) raise concerns regarding Arthur Andersen's materiality benchmark choice and its implications for the $51 million restatement by Enron. This evidence underscores the importance of studying auditors' benchmark choice in materiality judgments.

Our empirical analysis first focuses on the choice of materiality benchmarks. Consistent with our descriptive evidence, our regression results show that auditors are more likely to switch to a new benchmark type in the Post period. In cross-sectional tests, we find that this effect is primarily driven by firms adversely affected by the pandemic. However, for firms that had positive sales growth in 2020 and are in the financial sector, we do not find significant increases in the likelihood of changing materiality benchmark type during the Post period.

The above result begs the question of what drives auditors' decision to change benchmark choice. In our further analysis, we find that the magnitude of the change in the value of the prior year's benchmark strongly predicts switching to a new benchmark type in the current year. However, this relation is only present when the value of the prior year's benchmark decreases. In other words, auditors' decision to switch benchmark types seems to be asymmetrically affected by the *direction* of the change in the value of the prior year's benchmark. While ISA (UK) 320 recommends that the "volatility", rather than a mere decrease, of the benchmark size should be considered, the observed findings suggest that auditors may be more responsive to decreases than to increases in the benchmark size.[6] Our further analysis shows a weaker association between benchmark type change and benchmark value change in the Post period than the Pre period, suggesting a potential shift in the purpose of changing benchmark types during the Post period. These findings echo the concerns raised by the ICAEW (2020) regarding the potential misuse of benchmark type changes to avoid lower materiality values and increased audit effort.[7] Our results indicate that benchmark type changes may have indeed been used strategically in the post-pandemic period to retain pre-pandemic-level materiality values.

Second, we analyze the quantitative materiality amount and how it changed during the pandemic. Consistent with our descriptive evidence, our regression analyses do not show significant differences in materiality value between the Pre and Post periods, despite substantial changes in auditors' benchmark choice and firm fundamentals. Our results suggest that, while auditors changed benchmark choices during the Post period, they did not reduce the materiality value to respond to risk changes resulting from the pandemic.

One of the most striking impacts of COVID-19 on firms is the seismic shift in firm performance. This setting allows us to study how materiality value changes relative to firms' performance change and whether this relation differs in the Post period. Using sales growth to proxy for overall performance change, we find that, on average, the change in materiality value and sales growth exhibit a significantly positive association. However, this relationship is primarily driven by firms with *positive* sales growth. In other words, when revenue increases, materiality value increases significantly with sales growth. However, such a relation between sales growth and materiality value change is *not* present among firms with *negative* sales growth.

Taken together, our results suggest that while auditors adjusted their benchmark choice in response to the pandemic, they did not alter the materiality value substantially to respond to the heightened audit risk resulting from the pandemic. This could be attributed to the asymmetric patterns observed in auditors' materiality judgments: while declining (improved) performance is associated with an increased likelihood of changing the benchmark type (higher materiality values), it does not correspond to significant reductions in materiality values (increased likelihood of benchmark type changes). These results raise concerns regarding auditors' practices because ISA guidelines do not explicitly advise auditors to base their materiality assessment on the direction of firms' performance changes.

The third part of our empirical analysis examines whether the implications of materiality amount on audit outcomes differ during

[5] PCAOB's 2012 inspection report on KPMG documents a case in which the audit firm inappropriately used total assets as the materiality benchmark for a client, resulting in a materiality level three times higher than it would have been under conventional guidance based on income before taxes (PCAOB 2012). Further, Hallman et al. (2022) find that 61 % of UK audits rely on non-GAAP benchmarks, leading to a higher materiality threshold in 88 % of cases. Their findings indicate that the use of non-GAAP benchmarks often results in higher quantitative materiality amounts and lower audit quality.

[6] ISA (UK) 320, in section "Use of benchmarks in determining materiality for the financial statements as a whole", paragraph A3, states that the "volatility" of the benchmark should be taken into account when considering benchmark choices. This implicitly suggests that if the benchmark size is volatile (whether going up or down), auditors may consider changing the benchmark choice. In paragraph A4, ISA (UK) 320 further illustrates an example, explaining that "When profit before tax from continuing operations is volatile, other benchmarks may be more appropriate". Again, this indicates that benchmark change should be considered whether PBT is increasing *or* decreasing, i.e., the *direction* of the change is not mentioned by ISA. Regarding the percentage applied to the chosen benchmark, we do not find ISA guidelines suggesting that the *direction* of performance change should be a factor in determining the percentage applied.

[7] ICAEW noted specifically that "(a)n appropriate justification for a chosen benchmark would not be where it is done simply to avoid an increase in audit work as a consequence of a reduced materiality" (ICAEW 2020).

the pandemic period. We use audit fees, the likelihood of issuing going concern opinions, and audit delay as our proxy for audit outcomes. Overall, we find that materiality value is negatively associated with audit outcomes, which is consistent with prior literature (e.g., Appelbaum, Budnik, and Vasarhelyi 2020; Choudhary et al., 2019; Hallman et al., 2022; Livne et al., 2024). However, we do not find evidence that the relation between materiality value and audit outcomes is different in the Post period from the Pre period.

Our study makes several contributions to the existing literature. First, we contribute to the literature on how audit practices adapt to heightened audit risk during periods of high economic uncertainty. Second, we provide the first evidence on the implications of materiality value on audit outcomes during a crisis. We show that stricter materiality assessment is generally associated with longer audit delays, higher audit fees, and a higher likelihood of issuing a going concern opinion. This relation between materiality value and audit outcomes does not seem to be different in the Post and Pre periods. Future studies utilizing longer study periods and more data may provide deeper insights into the relationship between overall materiality value and audit/reporting quality during crises. Further, we contribute to the emerging literature on auditors' materiality assessment by showing, in a non-U.S. setting, how auditors' actual materiality assessment develops over time, the determinants of materiality judgments, and their implications on audit outcomes.

Finally, our research is informative for regulators and standard setters alike. Specifically, benchmark changes in materiality assessments—particularly during periods of declining client performance—may serve as early indicators of potential audit quality concerns. Such changes may reflect attempts to avoid lowering materiality thresholds, which could compromise audit effort and increase the risk of undetected misstatements. Monitoring the frequency and rationale behind benchmark adjustments may provide valuable insights into auditors' application of professional judgment and help identify engagements that warrant closer regulatory scrutiny.

2. Background and hypothesis development

2.1. Auditors' materiality judgment

Materiality, a key concept in both the theory and practice of auditing, quantitatively reflects the level of assurance that auditors provide about clients' financial statements. It is defined in the context of financial misstatements by the FRC (ISA (UK) 320) and the IAASB (2009), the former of which refers to material misstatements as "misstatement, including omissions, that individually or in the aggregate, could reasonably be expected to influence the economic decisions of users" (ISA (UK) 320, p.2). Materiality pervades the auditing process, being applied both in the planning and performing stages to evaluate identified and uncorrected misstatements, estimate undetected misstatements, and form the opinion in the auditor's report (Eilifsen and Messier 2015).

Scholars study factors influencing auditors' materiality judgments because of their critical importance in auditing decisions.[8] However, due to the lack of access to auditors' actual materiality values, early archival research on overall audit materiality employs materiality levels that are inferred or estimated based on (1) detected misstatements reflecting materiality assessment of both auditors and client management (Acito, Burks, and Johnson 2009; Keune and Johnstone 2012), (2) other indirect sources such as audit firm and authoritative guidance (Brody, Lowe, and Pany 2003; Eilifsen and Messier 2015, Chung, Geiger, Paik, and Rabe 2021), or (3) experiments where researchers can ascertain the effect of different materiality decisions in a controlled environment (Nelson, Smith, and Palmrose 2005; Bennett and Hatfield 2017; Messier and Schmidt 2018). Acito et al. (2009) noted that understanding the actual application of materiality in audit firms should be very informative for accounting scholars and the users of financial reports.

Recent studies have accessed actual materiality assessment data thanks to PCAOB proprietary data from inspection documents and the UK regulation (ISA (UK) 700) that requires disclosure of materiality judgment in audit reports for publicly listed companies since 2013 (Choudhary et al. 2019; Goh et al. 2023; Gutierrez et al. 2018; Hallman et al. 2022; Livne et al. 2024; Quick et al. 2023; Wellmeyer et al. 2024). These studies show that materiality assessment is highly important for the auditing process and audit quality, is subject to professional judgment, and is associated with several firm-level characteristics.[9] However, despite direct and indirect evidence suggesting that materiality values vary broadly across clients and within audit firms, we know little about whether and how auditors' materiality assessment may be affected by periods of extreme economic downturn.

2.2. Auditors' response to extreme economic conditions

Theoretically, auditors are expected to observe audit risk caused by economic events (Doogar et al. 2015). Under macroeconomic shocks, as clients' and auditors' business and operation environments change drastically, auditors' auditing practices in normal conditions may no longer be applicable. However, prior literature provides limited knowledge about how the actual auditing practice changes in crises periods.

A few studies based on the 2008–09 global financial crisis (GFC) attempt to address this issue. However, these studies mainly infer changes in auditor practice from the changes in audit and non-audit fees and audit quality (e.g., Alexeyeva and Svanström 2015;

[8] See, for example, Estes and Reames (1988), Chewning et al. (1989), DeZoort et al. (2006).

[9] In our study, when examining the determinants of materiality value, we largely follow the methodology in Choudhary et al. (2019). But we note that our paper is different from Choudhary et al. (2019) in many ways. Specifically, our longitudinal data covering the years from 2015 to 2022 allows us the study the *changes* in materiality value and how it responds to a global crisis such as the COVID-19 pandemic. In addition, our data allows us to study changes in materiality value relative to changes in firm characteristics. Finally, we use UK data for FTSE350 firms, whereas Choudhary et al. (2019) is based on data from PCAOB inspections, which may not represent the general U.S. listed firm population.

Doogar et al. 2015; Krishnan and Zhang 2014; Xu et al. 2013). As many factors influence audit outcomes and do not necessarily reflect auditors' decision-making, the inference from such studies might be subject to limitations. For example, Doogar et al. (2015) find that the risks caused by the financial crisis, such as retention risk, distribution support risk, and investment risks, are salient drivers of audit fees in the bank audit engagements during but not before the GFC. Hence, they suggest that auditors can recognize and respond to the financial statement impacts of economic shocks. However, as noted by the authors, it remains unclear whether the variation in audit fees is due to a change in audit effort or audit risk premium.

The outbreak of COVID-19 may help us shed some light on this issue. The COVID-19 pandemic led to, despite the efforts of governments and regulating bodies, the deepest global recession in decades (The World Bank 2020), generating an environment of exacerbated economic uncertainty. The pandemic affected health care, population mobility, and economic growth (Baker et al. 2020). Most countries adopted quarantine measures, disrupting the supply chain, production process, and product demand. The drastic change caused by COVID-19 may substantially increase audit risk due to (1) its impact on firm's reporting process and internal control, (2) the sudden shift in audit firms' audit practice, and (3) heightened economic uncertainties.

Recent studies suggest that the pandemic adversely affected firms' financial reporting quality (Hsu and Yang 2022) and firms' internal and external transparency (Ho et al. 2023).[10] With regard to auditing practice, recent studies suggest that the pandemic indeed has a heavy impact. For example, Harjoto and Laksmana (2022) find evidence that, during the pandemic, auditors charge higher fees and have longer audit delays. Kend and Nguyen (2022) show that three percent of audit procedures taken during the Covid period were specially designed to address Covid-specific risk. Tighe (2022) uses interview evidence to demonstrate how remote working affected junior auditors' professional development and personal lives. These findings are consistent with the notion that audit engagements are more complex and involve higher risk during the pandemic. Indeed, Gong et al. (2022) show that audit engagements that were affected by Covid restrictions exhibit lower audit quality.

Although the above studies have examined the consequences of the pandemic on financial reporting and auditing, it remains unclear (1) whether and to what extent auditors alter their materiality assessment in practice, which has significant effects on overall audit quality and financial reporting quality, and (2) whether the relation between materiality assessment and audit outcome changes during the pandemic. In this study, we attempt to fill this void in the literature.

2.3. Professional judgment and materiality during the COVID-19 pandemic

In audit engagements, auditors should exercise professional judgment and maintain professional skepticism (ISA (UK) 200). This could be more important than ever during COVID-19, as was highlighted by the International Federation of Accountants (IFAC 2020) in its "Summary of COVID-19 Audit Considerations" and the FRC in its bulletin of guidance for auditors affected by COVID-19.[11] Indeed, several audit firms and regulating bodies warned during this period about the heightened risk of misstatement caused by circumstances brought on by the pandemic, such as a possible loss of financing, ineffective strategies, inability to estimate or meet certain targets appropriately, challenges of home-working, or incentives and pressures on management (BDO, 2020; Deloitte, 2020; FRC, 2020; IFAC, 2020).

As the global economy experienced unprecedented volatility, financial statement users may have sought to mitigate heightened uncertainty by demanding more rigorous auditing procedures, which require lower levels of materiality. This proposition is supported by both anecdotal evidence and academic studies. For instance, EY's 2021 report, "How can a high-quality audit help provide certainty in uncertain times", states that, "(t)he delivery of high-quality audits has become even more important as the health and financial impacts of the COVID-19 pandemic have affected economies across the globe". The report further emphasizes the need for "confidence in the quality of the audits that support the capital markets" and highlights that "high-quality audits add value across a company's operations and provide trust to a range of stakeholders" (Delarue 2021).

Academic research also aligns with this view. A recent study by D'Augusta and Grossetti (2023) suggests that the pandemic heightened investor concerns about the reliability of earnings news and its impact on valuations. Their findings show a significant increase in post-announcement abnormal volatility for earnings news during the pandemic compared to the pre-pandemic period. This suggests that investors find it more challenging to price the earnings news due to increased uncertainty. The SEC's issuance of Disclosure Guidance-Topic No. 9, encouraging U.S. companies to disclose more COVID-related information, further demonstrates the heightened demand for information during the pandemic.

Taken altogether, the above discussion points towards a need for adaptation for materiality decisions during unstable times. Conventional materiality benchmarks may not be suitable at the onset of the pandemic, as firms' results are heavily affected by the COVID-19 disruption. Previous materiality values may also be inefficient in capturing the current increased risk of misstatements, and auditors are expected to use their professional judgment and skepticism to handle these circumstances. Supporting these notions, the ICAEW stated in its guidance titled "COVID-19: determining materiality" that "(p)revious benchmarks used for determining materiality may not be appropriate, particularly where operations and/or revenues have significantly changed due to COVID-19." Furthermore, the guidance notes that "(i)t is likely that overall materiality will be set at a lower level than previously for some audits,

[10] Many firms suspended their earnings guidance during the pandemic. JP Morgan, in a note to clients in April 2020, said that 86 of the S&P 500 companies have suspended earnings guidance (Pisani 2020).

[11] This is also reflected in the ICAEW 2020 report titled "COVID-19: determining materiality". Specifically, the report states that "(m)ateriality is a hugely challenging area for auditors and one that will require judgment in the current circumstance", and that "(g)iven the pervasive impact of COVID-19 on many businesses, auditors need to be mindful of the fact that materiality impacts the whole audit" (ICAEW 2020).

which could increase the scope and extent of testing needed" and that "(a)uditors may need to spend more time on determining materiality than they might ordinarily, and some conservatism may be appropriate".

In practice, it is *ex-ante* unclear how auditors' materiality judgments may adapt to the Covid-19 crisis. On the one hand, the dramatic shift in firm performance and the macroeconomic environment brings substantial risk that may require more stringent work and an extended audit scope. On the other hand, various types of restrictions and healthcare protocols abruptly reshaped auditors' workflows, which may incur substantial costs and impede auditors from implementing significant modifications to their established practices.

Taken together, the impact of the COVID-19 crisis on auditors' materiality assessment is ultimately an empirical question. Auditors' materiality judgment may exhibit significantly different patterns during the Post period if the effect of higher audit risk dominates and auditors need to adjust their audit work accordingly. However, travel restrictions and resource limitations may not allow significant changes to the audit process. In that case, we do not expect to observe significant differences in audit materiality judgment in the Post period.

Thus, following the previous discussion, we state the following null hypothesis:

H1. *In auditors' materiality assessments, the benchmark choice is not significantly different in the post period compared to the pre-pandemic period.*

H2. *The assessed materiality value is not significantly different in the post period compared to the pre-pandemic period.*

Consistent with the notion that materiality strictness guides audit effort, prior literature has shown that the materiality level is significantly and negatively associated with audit fees and several proxies of audit quality (Choudhary et al. 2019; Hallman et al. 2022; Livne et al. 2024). During the pandemic period, however, auditors had to grapple with (1) higher risk of material misstatements, (2) the sudden application of new audit approaches, and (3) extreme macroeconomic uncertainty. All these factors may lead to changes in the role of materiality assessment in the auditing process and audit outcomes, such as audit fees, issuing going-concern opinions, and audit delay.

On the one hand, materiality assessment may play a more critical role in ensuring truthful financial reporting during the pandemic. The pandemic's heavy impact on firms' internal reporting process, supply chain, business performance, and prospects could increase the risk of material misstatements. The rapid development in public health restrictions also necessitated complex judgments and estimations. Furthermore, since investors may be particularly concerned about firms' financial health during the pandemic, their scrutiny could also place greater pressure on auditors. Thus, materiality assessment may be more important for audit outcomes during the Post period.

For example, a given decrease in materiality level may have required a more substantial increase in audit effort, reflected in higher audit fees and audit delay, due to heightened audit risk in the Post period. Moreover, the same level of decrease in materiality level might lead to a higher likelihood of detecting clients' going concern risk due to the heightened business risk in the Post period than in the Pre period. Based on this argument, we predict that the association between materiality value and audit outcomes is stronger in the Post period.

On the other hand, there are also reasons why the relation between materiality level and audit outcomes may be weaker during the pandemic. First, auditors may have placed greater emphasis on qualitative factors in their materiality judgment rather than on quantitative values. This could lead to more rigorous scrutiny of certain line items relating to, for example, going concern issues. Such a change may lead to weaker associations between the overall materiality level and audit outcomes in the Post period. Second, the pandemic necessitated increased reliance on alternative audit procedures, often of lower quality, due to remote working and financial constraints. This could limit the effectiveness of stricter materiality levels in improving audit outcomes.

Third, many companies faced severe financial difficulties in the Post period, which may limit auditors' ability to maintain audit pricing and effort levels. In other words, a decrease in the materiality level may not lead to a proportional increase in audit fees or audit effort, as was the case in the pre-pandemic period. Consequently, the association between materiality level and audit outcomes may be weaker in the Post period. Based on the above three factors, we predict that the association between materiality value and audit outcomes may be weaker in the Post period.

Taken together, we believe that it is *ex ante* not clear whether the implication of materiality level on audit outcomes may change during the pandemic period.

H3. *The implications of materiality value for audit outcomes, as proxied by audit fees, issuance of going-concern opinions, and audit delay, are not significantly different in the post period compared to the pre-pandemic period.*

3. Sample and descriptive evidence

3.1. Sample selection

Materiality assessments in public firms in the United Kingdom are publicly available under ISA (UK) 700, which became effective in 2012 and was last revised in November 2019. We hand-collected audit materiality information from the audit reports of the companies included on the 2020 FTSE 350 list. Specifically, we collect (1) the quantitative materiality amounts and (2) the chosen benchmark types. Additionally, financial information is collected from Compustat, and we retrieve audit fees and opinions from the Audit Analytics European database. Corporate governance information is retrieved from BoardEx.

We perform our baseline analyses based on a sample of 308 unique firms, leading to 2,295 firm-year observations from 2015 to

Table 1
Sample selection.

		Number of Unique Firms	Number of observations
List of FTSE350 firms		345	
ISIN number can be identified in Audit Analytics and Compustat		315	
Materiality value disclosure available, and size variables (asset, revenue, and PBT) not missing		308	**2295**
Financial Year ending in:	2015		265
	2016		273
	2017		282
	2018		286
	2019		292
	2020		297
	2021		304
	2022		296
Less: observations with missing control variables			(185)
Number of observations for the main analysis			**2110**
Number of observations when the change in materiality assessment is examined			**1840**

2022. We present our sample selection process in Table 1. We start from the original 350 firms in the FTSE 350 index in 2020 and collect their annual reports in our sample period. We lose some observations each year because of missing data, such as ISIN codes or assets, revenue, or pre-tax income values in the Compustat database. We also note that the sample size is slightly reduced for analyses involving firm-level financial characteristics, benchmark type choice (some firms disclose materiality value but not the materiality benchmark type), and corporate governance-related variables. The sample size is further reduced when we examine the change of materiality assessment (benchmark type and materiality value).

We convert all financial numbers stated in foreign currencies to British pounds (GBP).[12] For observations with annual reports ending before and including February 2020, we designate them as the "Pre-COVID" group, while observations with the financial year ending from March 2020 onwards are designated as the "Post-COVID" group. We also present the sample breakdown by year and industry in Table 1.

Table 2 presents the summary statistics of the variables used for our regression analyses. All variables are defined in the Appendix. The mean (median) materiality value in our sample firms is 35.86 (11.5) million British Pounds. The mean (median) materiality value scaled by total assets (*MAT_PRCT*) is 0.654 % (0.508 %). We find that 8.4 % of our sample firms' auditors changed their benchmark type choice (*CHG_BENMAR_TYPE*).

3.2. Descriptive evidence on Auditors' materiality judgment

This section presents descriptive evidence on auditors' materiality judgment and its change during the pandemic.

Our first analysis aims to provide insight into auditors' benchmark selection over the sample period. We categorize auditors' chosen benchmark into seven distinct categories and graph the distribution of these choices each year in Fig. 1. Consistent with previous research (Choudhary et al. 2019; Quick et al. 2023), our results in Fig. 1 suggest that most auditors use a Profit Before Tax (PBT)-related benchmark. Equity is the second most popular benchmark, followed by assets, revenue, and other items from financial statements. More importantly, Fig. 1 supports rejecting our H1 as there are visible changes between the Pre-period (2015–2019) and the Post-period (2020–2022). Specifically, PBT-related benchmark choice decreased from around 60 % to 50 %, whereas there is an increase in the usage of revenue, assets, and blended-based benchmarks.

Since most firms experienced a dramatic change in operations and profitability during the pandemic, our finding suggests that auditors' choices are in line with ISA's recommendation that auditors should consider the relative volatility of each benchmark in making their choices (e.g., ISA (UK) 320). Interestingly, we find that UK auditors rarely use the benchmark "net income", which is commonly used in the US (Choudhary et al. 2019). Furthermore, unlike Quick et al. (2023), we keep FIR firms in our sample and find that more than 70 % of those FIR firms use asset or equity as materiality benchmarks (FIR firms include firms in the Finance, Insurance, and Real Estate industry). Due to the relatively stable nature of asset/equity relative to income, these firms are less likely to change the materiality benchmark type during the COVID-19 pandemic.

Second, we aim to provide insight into the variation in the "rule-of-thumb" quantitative materiality assessment and the use of professional judgment. We follow Choudhary et al. (2019) and calculate the quantitative materiality value expressed as a percentage of the absolute value of profit before tax (Materiality/|PBT|). We graph the distribution of this ratio separately for the two periods in Fig. 2. The distribution of Materiality/|PBT| in the pre-Covid period is highly concentrated at 5 %. This is consistent with the findings of Choudhary et al. (2019). However, the distribution is more dispersed in the post-period. The deviation from 5 % of PBT may be an indication that auditors are employing higher levels of professional judgment in arriving at the quantitative materiality, rather than simply following a general rule of thumb.

Third, in Table 3, we report pairwise correlations for the dependent variables and key independent variables as well as univariate

[12] We use the exchange rate published by the OECD for translating currencies: https://data.oecd.org/conversion/exchange-rates.htm.

test results comparing auditors' materiality assessment and audit outcomes in the Pre- and Post period. In Panel A, we find that *POST* is significantly and positively correlated with changing benchmark type (*CHG_BENMAR_TYPE*), but not with the actual materiality amount (*MATERIALITY*), suggesting that auditors made substantial adjustments to the benchmark type choice in the post period. Second, we show that *POST* positively correlates with the three audit outcome measures: *LN_AUDFEE, GOING_CONCERN,* and *DELAY*. These results suggest that during the pandemic period, there have been substantial changes in the audit practice: auditors charged higher fees, issued more going concern opinions, and it took longer to finish the audit engagement. Third, we find that materiality strictness (*MAT_PRCT,* materiality value scaled by total assets) is significantly and negatively correlated with audit fees (*LN_AUDFEE*), consistent with prior literature showing that stricter audits are more costly (Choudhary et al. 2019).

Table 2
Descriptive statistics.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	N	Mean	SD	p1	p5	Median	p95	p99
*Dependent variables***								
MATERIALITY (£m)	2295	35.861	88.509	0.76	1.942	11.5	140	508.9
MAT_PRCT	2110	0.654	0.769	0.017	0.087	0.508	1.448	2.22
CHG_BENMAR_TYPE	1840	0.084	0.277	0	0	0	1	1
DELTA_MAT	1840	0.117	0.392	−0.439	−0.25	0.061	0.6	1.333
|DELTA_MAT|	1840	0.203	0.355	0	0	0.125	0.6	1.333
LN_AUDFEE	2110	13.608	1.679	10.043	10.373	13.639	16.409	17.445
GOING_CONCERN	2040	0.013	0.114	0	0	0	0	1
DELAY	2110	63.745	16.921	31	42	61	97	119
Independent variables								
POST	2295	0.386	0.487	0	0	0	1	1
*|ΔBENMAR_SIZE_PRCT|**	1699	0.699	1.922	0.004	0.017	0.192	2.557	11.457
*NEG_ΔBENMAR**	1699	0.391	0.488	0	0	0	1	1
NEG_SG	1840	0.372	0.484	0	0	0	1	1
Control variables								
LN_REVENUE	2295	6.846	1.881	2.249	3.944	6.798	10.054	11.623
LN_ASSETS	2295	7.936	1.719	4.464	5.73	7.618	11.332	13.634
LN_ABS_PBT	2295	5.11	1.557	0.881	2.682	5.037	7.869	9.302
REVENUE (£m)	2295	5641.308	20611.939	−390	7.679	867.2	22,964	111675.53
ASSETS (£m)	2295	31856.644	164691.72	86.865	307.847	2034.499	83,443	833,893
ABS_PBT (£m)	2295	658.909	2235.157	2.413	14.608	154	2616	10964.876
AC_INDEP	2110	94.161	12.319	42.86	66.67	100	100	100
AQC	2110	0.374	0.484	0	0	0	1	1
NEW_AUDITOR	2110	0.091	0.287	0	0	0	1	1
BOARDSIZE	2110	8.707	2.385	4	5	9	13	15
BREAKEVEN	2110	0.078	0.269	0	0	0	1	1
BUSY	2110	0.523	0.500	0	0	1	1	1
GBP	2110	0.809	0.394	0	0	1	1	1
KAM_N	2110	3.338	1.638	1	1	3	7	8
LOSS	2110	0.141	0.348	0	0	0	1	1
PBTGROWTH	2110	−0.238	3.132	−15.786	−3.728	0.01	2.618	12.15
POSITIVE_STREAK	2110	0.445	0.497	0	0	0	1	1
PRICE_VOL	2110	2.227	7.322	0.65	0.883	1.746	3.719	5.729
RESTATEMENT_ANNOUNCE	2110	0.056	0.231	0	0	0	1	1
ROA	2110	0.074	0.108	−0.186	−0.073	0.056	0.272	0.518
SALESGROWTH	2110	0.026	1.134	−4.94	−1.321	0.052	1.203	5.404
SMALLPROFIT	2110	0.084	0.278	0	0	0	1	1

Note:
**Please see footnote 13 regarding differences in the number of observations for each variable.
*The variables *|ΔBENMAR_SIZE_PRCT|* and *NEG_ΔBENMAR* have smaller number of observations because for the tests based on these variables, we only consider firms that use benchmarks related to PBT, Assets, Revenue, and Equity. This is because firms often make adjustments to the chosen benchmark and usually do not state the exact amount of the benchmark size. For these four types of benchmarks, we can directly use the corresponding line item in the financial statements as a proxy for the actual benchmark size. For the other benchmark types, it is hard to find a consistent line item.

[13] There are 2,295 observations for the key variables (materiality value and firm size). But for the tests involving controls for other accounting and corporate governance related variables, the observation number is 2,110. Finally, the observation number is further reduced to 1,840 in tests that involve variables related to benchmark type and materiality value change (*CHANGE_BENCHMARK, DELTA MAT, |DELTA MAT|*) because we do not have materiality information in 2014 to calculate these variables in 2015.

In Panel B, our *t*-test results show that auditors are more likely to change the benchmark type[14] (*CHG_BENMAR_TYPE*), but do not significantly change the actual materiality value (*MATERIALITY* or *MAT_PRCT*) in the Post-period. This result contradicts the ICAEW guidance, which stated that "it is likely that overall materiality will be set at a lower level than previously for some audits, which could increase the scope and extent of testing needed" (ICAEW 2020). Overall, our descriptive evidence suggests that auditors have responded to the pandemic by adjusting their benchmark type choice but *not* by adjusting the materiality value downward.

Moreover, we examine the magnitude of change in materiality value; since the change could be both upward and downward, we use the *absolute* value of the difference in materiality value from year *t-1* to *t*, scaled by materiality value in year *t-1*, to capture the magnitude of such change (|*DELTA_MAT*|). We find that |*DELTA_MAT*| is significantly *higher* in the post-period than in the pre-period, suggesting that auditors had to make larger magnitudes of adjustment to the materiality amounts in the pandemic. We also find that auditors charge higher audit fees (*LN_AUDFEE*),[15] have longer audit delays (*DELAY*), and are more likely to issue going-concern opinions (*GOING_CONCERN*) in the post-period.

4. Regression analyses

We carry out regression analyses in two parts. First, we focus on the key components of auditors' materiality assessment: benchmark type choice and the assessed materiality value. Moreover, we examine whether there are substantial changes during the pandemic. Second, we investigate the implications of materiality value on audit outcomes and whether such implications changed during the pandemic.

4.1. Auditors' materiality assessment

4.1.1. Materiality benchmark type change

4.1.1.1. Determinants of materiality benchmark type change. In this section, we test our H1 by investigating the factors that may influence auditors' decision to change benchmarks during the pandemic by estimating the following logit model based on firm-year level:

$$Pr(CHG_BENMAR_TYPE = 1) = \beta_0 + \beta_1 POST + \delta Size + \gamma OtherChar + FE + \epsilon_{i,t},$$

where the dependent variable *CHG_BENMAR_TYPE* is equal to one if the auditor changed the benchmark type for calculating the materiality amount, and zero otherwise. We include a set of control variables related to firm size and other characteristics. In Table 4, Panel A, we first examine whether there is any difference in the likelihood of changing benchmark type between the Pre and Post periods. We use model (1) but only control for firm size (*LN_ASSETS, LN_REVENUE*, and *LN_ABS_PBT*), industry fixed effects, and audit firm fixed effects. We do not control for other performance- or risk-related variables because these variables are affected by *POST* and are probably already considered in auditors' decision for benchmark choice.[16] All variables are defined in the Appendix.

Table 4, Panel A, reports the results of this analysis. Column (1) shows the results for the full sample. We find that in the Post period, auditors are more likely to change the benchmark type (*CHG_BENMAR_TYPE,* coefficient = 0.93, $p < 0.01$). We also examine benchmark type changes across different industries. We split the sample based on whether a firm is in (1) the FIR industry, (2) the high-contact industry, or (3) other industries, and we present the results in Columns (2–4). High-contact industries are the industries that had the largest impact by COVID-19 according to the Office for National Statistics (UK). These "high-contact" industries are more reliant on physical interaction and so have been more adversely affected by the coronavirus restrictions that were in place. These industries include wholesale and retail; transportation and storage; accommodation and food services; arts, entertainment and recreation.

We find that in FIR industries, auditors do not significantly increase the likelihood of changing the benchmark type during the pandemic. One explanation for this is that firms in FIR industries tend to use more stable benchmark types (such as assets and equity) that may not have been heavily affected by the pandemic. By contrast, auditors exhibit a higher propensity to change the benchmark type in high-contact and other industries in the Post period, probably because most firms use PBT-related benchmarks, which were affected heavily by the pandemic.

We also split the sample by companies' performance in 2020. Columns (5) and (6) show that, for firms that experienced positive sales growth in 2020, the likelihood of changing benchmark type in the Post period is not significantly different from the Pre period.

[14] It is important to note that we only classify a benchmark type as having been changed when the auditor uses a completely different *line item* on which to base the materiality value calculation. We observe that some auditors opted to alter how they calculate materiality by applying some form of normalization to the benchmark. For example, changing from using "adjusted profit before tax" as benchmark to "a 3-year average of adjusted profit before tax". Such change is not considered a change in the materiality benchmark type, as per our analysis.

[15] A few examples of audit fee change in actual numbers are: (a) The Baillie Gifford Japan Trust PLC audit fee increased from £21,000 in 2019 (annual report ending August 31) to £30,000 in 2020. (b) Lancashire Holding audit fee increased from $1.2m in 2019 to $1.9m in 2020. (c) Diploma PLC audit fee in 2018, 2019, 2020, and 2021 are: £0.6m, £0.7m, £0.8m, £1.3m respectively. (d) Rathbones PLC audit fee in 2018, 2019, 2020, 2021 are: £0.118m, £0.1m, £0.106m, £0.152m respectively.

[16] In light of Whited et al (2022), we consider this as the most appropriate model specification. We note, however, that the coefficient on *POST* remains highly significant even if we control for other firm characteristics (untabulated).

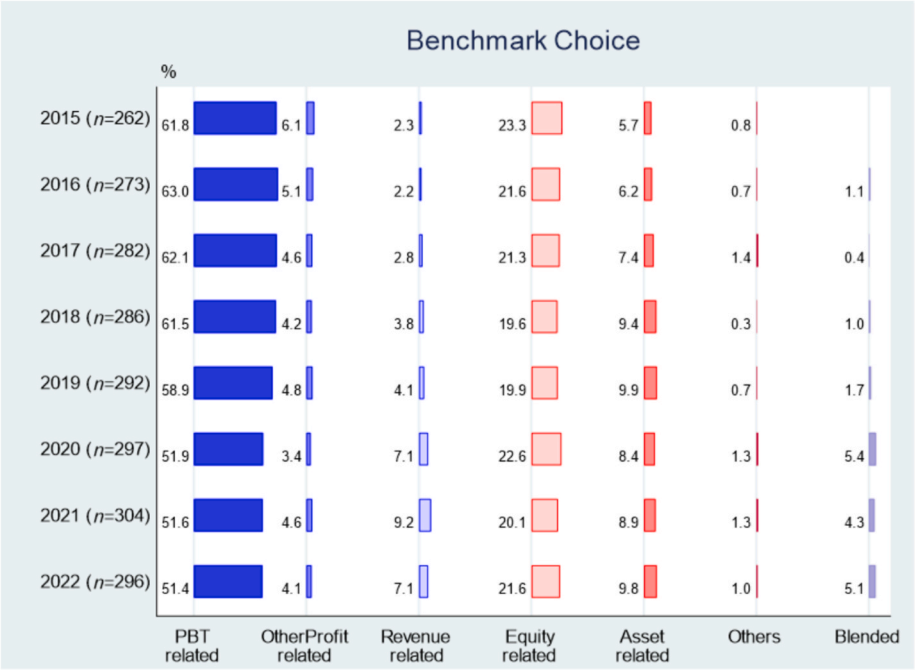


Fig. 1. Benchmark choice by year. Notes: This figure shows the percentage of firms in our sample that choose various benchmarks. We group benchmark choices in seven categories: (1) Profit before tax (PBT) related, (2) Other Profit-related, (3) Revenue related, (4) Equity related, (5) Asset related, (6) Others and (7) Blended. Group (2) includes firms that choose, for example, "EBITDA", or "Gross Profit" as benchmark, while Group (6) includes choices such as "Cash" or "Expenses".

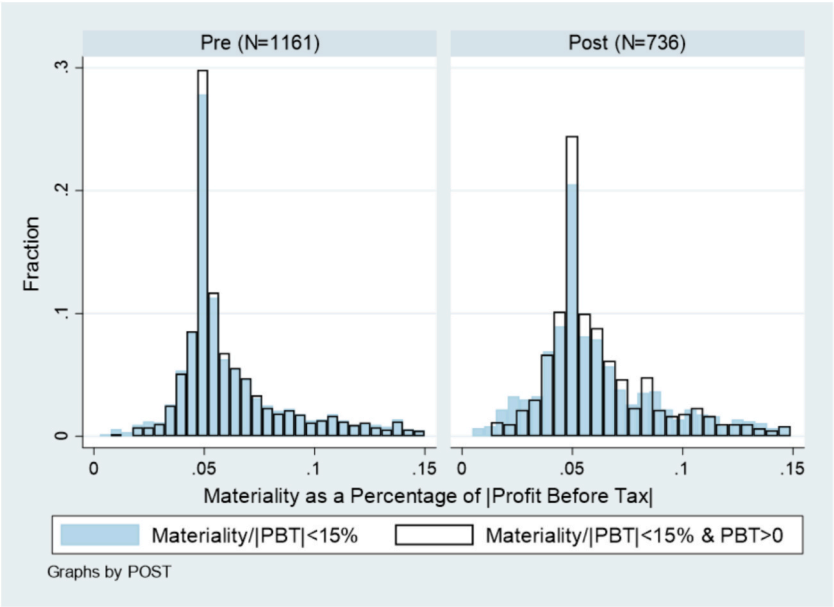


Fig. 2. Materiality as a percentage of profit before tax (|PBT|). Note: This figure shows, for Pre and Post period separately, the distribution of firms' quantitative materiality value as a percentage of the absolute value of pretax income (profit before tax). Following Choudhary et al. (2019), we only show it for firms when Materiality/|PBT| is less than 15 %.

Table 3
Correlation table and univariate tests.

Panel A: Correlation table

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) MATERIALITY	1.000										
(2) CHG_BENMAR_TYPE	**0.118**	1.000									
(3) DELTA_MAT	0.000	**0.069**	1.000								
(4) LN_AUDFEE	**0.468**	**0.135**	**−0.054**	1.000							
(5) GOING_CONCERN	−0.029	**0.080**	−0.015	−0.002	1.000						
(6) DELAY	**−0.110**	0.013	**0.057**	**−0.123**	**0.106**	1.000					
(7) POST	0.032	**0.116**	0.027	**0.147**	**0.050**	**0.105**	1.000				
(8) |ΔBENMAR_SIZE_PRCT|	0.013	**0.145**	**0.056**	**0.151**	**0.071**	0.042	**0.086**	1.000			
(9) NEG_ΔBENMAR	0.006	**0.107**	**−0.318**	**0.139**	**0.067**	0.028	**0.109**	**0.124**	1.000		
(10) MAT_PRCT	**−0.111**	**−0.100**	**0.089**	**−0.376**	−0.021	0.019	−0.040	**−0.117**	**−0.164**	1.000	
(11) NEG_SG	**0.046**	**0.050**	**−0.250**	**−0.097**	**0.064**	0.030	**0.090**	−0.010	**0.317**	−0.026	1.000

Panel B: Univariate tests

	Pre		Post				
	N	Mean	N	Mean	Diff	Std. Error	Obs.
MATERIALITY	1258	36.4882	852	40.32	−3.8318	4.0264	2110
MAT_PRCT	1258	0.6674	852	0.6346	0.0327	0.0341	2110
CHG_BENMAR_TYPE	1007	0.0536	833	0.12	−0.0664***	0.0129	1840
DELTA_MAT	1007	0.1005	833	0.1364	−0.0359*	0.0183	1840
|DELTA_MAT|	1007	0.1778	833	0.2338	−0.0560***	0.0166	1840
LN_AUDFEE	1258	13.4792	852	13.7993	−0.3201***	0.0742	2110
GOING_CONCERN	1258	0.0087	852	0.0188	−0.0100**	0.005	2110
DELAY	1258	62.0564	852	66.2371	−4.1807***	0.7454	2110

Note: correlation coefficients in bold represent a 5 % significance level.

Table 4
Materiality benchmark type change.

Panel A	(1)	(2)	(3)	(4)	(5)	(6)
		CHG_BENMAR_TYPE				
		Sample Split				
	Full Sample	By industry type			By sales growth in 2020 Positive or Negative	
		FIR	High Contact	Others	Positive	Negative
POST	0.9300***	0.1888	1.6472***	1.0705***	0.1362	1.3010***
	(5.07)	(0.55)	(4.00)	(3.88)	(0.41)	(5.60)
LN_ASSETS	0.4378***	0.2041	0.6263	0.7100***	0.4934***	0.4374***
	(4.24)	(1.30)	(1.48)	(3.50)	(3.07)	(3.01)
LN_REVENUE	−0.0375	0.0484	−0.2790	−0.1636	−0.0090	−0.0779
	(−0.30)	(0.20)	(−0.80)	(−0.87)	(−0.03)	(−0.49)
LN_ABS_PBT	−0.2376***	−0.0512	−0.1410	−0.3534***	−0.4143***	−0.1764*
	(−3.10)	(−0.29)	(−0.81)	(−2.83)	(−2.80)	(−1.87)
Constant	−4.9573***	−4.9714***	−3.6256**	−6.4351***	−4.7817***	−4.9463***
	(−8.11)	(−4.68)	(−2.19)	(−5.59)	(−4.46)	(−6.39)
Observations	1,840	695	305	840	625	1,215
Year FE	NO	NO	NO	NO	NO	NO
Industry FE	YES	YES	YES	YES	YES	YES
Audit firm FE	YES	YES	YES	YES	YES	YES
Pseudo R^2	0.103	0.0590	0.245	0.116	0.0801	0.154

Panel B	(1)	(2)	(3)	(4)	(5)
			CHG_BENMAR_TYPE		
	Full sample		*ΔBENMAR_SIZE_PRCT* Positive or Negative		Full sample
			Negative	Positive	
|*ΔBENMAR_SIZE_PRCT*|	0.1571***	0.1603***	0.1843***	0.0236	0.0287
	(4.73)	(4.37)	(4.12)	(0.28)	(0.36)
NEG_ΔBENMAR					0.3813*
					(1.73)
NEG_ΔBENMAR×|*ΔBENMAR_SIZE_PRCT*|					0.1424
					(1.57)
LN_ASSETS	0.4021***	0.4208***	0.5682***	0.2236	0.3960***
	(3.63)	(3.32)	(2.62)	(1.21)	(3.10)
LN_REVENUE	−0.0120	−0.0150	−0.2344	0.2222	−0.0045
	(−0.09)	(−0.11)	(−1.20)	(0.95)	(−0.03)
LN_ABS_PBT	−0.3183***	−0.3069***	−0.3404***	−0.2576	−0.2742***
	(−3.60)	(−3.34)	(−2.75)	(−1.39)	(−3.02)
AQC		−0.1175	−0.1199	−0.1450	−0.1098
		(−0.44)	(−0.33)	(−0.34)	(−0.41)
NEW_AUDITOR		1.5802***	1.4708***	1.9371***	1.6147***
		(5.49)	(3.26)	(4.73)	(5.58)
BUSY		−0.2791	−0.0669	−0.4924	−0.3053
		(−1.14)	(−0.19)	(−1.41)	(−1.25)
GBP		−0.2433	−0.2585	−0.3200	−0.2629
		(−0.82)	(−0.63)	(−0.70)	(−0.89)
KAM_N		0.0098	0.0481	−0.0274	−0.0161
		(0.12)	(0.40)	(−0.23)	(−0.19)
PRICE_VOL		0.1359*	0.1090*	0.2128	0.1271*
		(1.78)	(1.95)	(0.96)	(1.77)
RESTATEMENT_ANNOUNCE		0.0437	0.2389	−0.1407	0.0641
		(0.13)	(0.52)	(−0.25)	(0.18)
BOARDSIZE		0.0322	0.0828	0.0326	0.0359
		(0.53)	(0.88)	(0.34)	(0.58)
AC_INDEP		−0.0116	−0.0043	−0.0164	−0.0127*
		(−1.52)	(−0.36)	(−1.53)	(−1.66)
Constant	−5.1149***	−4.8832***	−4.8704***	−5.4597***	−4.9914***
	(−6.30)	(−4.82)	(−3.15)	(−3.17)	(−4.86)
Observations	1,699	1,699	665	933	1,699
Year FE	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES
Size controls	YES	YES	YES	YES	YES
Firm characteristics controls	NO	YES	YES	YES	YES
Audit firm FE	YES	YES	YES	YES	YES
Pseudo R^2	0.132	0.186	0.241	0.185	0.194

Note: This table presents logit regression results based on model (1). Panel A reports Logit regression results; the model includes control for only firm size related variables, industry fixed effects, and audit firm fixed effects. The key variable of interest is *POST*. Panel B reports Logit regression results also based on model (1) to examine whether the change in benchmark size affects the likelihood of switching to a new benchmark type. In Column (1), we only control for firm size related variables. From Column (2) onwards, we also include other firm-level characteristics (note that these controls are not performance related). The key variable of interest is |*ΔBENMAR_SIZE_PRCT*|. Variable definitions are in the Appendix. Robust *z*-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

However, for firms that experienced negative sales growth in 2020, the likelihood of changing benchmark type in the Post period is significantly higher than in the Pre period.

As shown in Table 4, Panel A, auditors were more likely to adjust their benchmark type choice during the pandemic, particularly for firms experiencing negative performance. ISA 320 suggests that volatile profits can necessitate a shift to alternative benchmarks such as total revenue[17] (ISA (UK) 320). Thus, we further examine whether the magnitude of benchmark size change is associated with the likelihood of switching to a new benchmark type in Table 4, Panel B.

We calculate the absolute value of the percentage change in the size of prior year's benchmark from year *t-1* to *t* (|*ΔBENMAR_SIZE_PRCT*|) and add this variable in model (1). Please note that we only calculate this variable for firms that use benchmarks related to PBT, Assets, Revenue, and Equity.[18] This is because firms often adjust the chosen benchmark and usually do not state the exact amount of the benchmark size. For these four types of benchmarks, we can directly use the corresponding line item in the financial statements as a proxy for the actual benchmark size. For other benchmark types, it is hard to find a consistent line item. Our sample size for this test is, therefore, slightly reduced from the test in Panel A.

We also include risk-related variables captured by *RESTATEMENT_ANNOUNCE*, *KAM_N* (the number of key audit matters), and stock price volatility in the year (*PRICE_VOL)*. Further, we control for auditor busyness (*BUSY*), a new auditor indicator (*NEW_AUDITOR*), an indicator for acquisition activity in the year (*AQC*), and an indicator for reporting currency in British Pounds (*GBP*). We also include *BOARDSIZE* and audit committee independence (*AC_INDEP)* to control for corporate governance level. Please note that we do not control for performance-related variables in the analysis, because such variables are likely highly correlated with |*ΔBENMAR_SIZE_PRCT*|.[19] Columns (1) and (2) of Table 4, Panel B, show that |*ΔBENMAR_SIZE_PRCT*| is indeed significantly and positively associated with the likelihood of changing benchmark type (coefficient in Column 1 is 0.157, $p < 0.01$); this finding is consistent with ISA 320's guidance on benchmark type change.

Given that we find the likelihood of changing benchmark type is higher in the Post period only for firms that were adversely affected by the pandemic (Table 4 Panel A, Columns 5 and 6), we further we split the sample into firms with *decreasing* and *increasing* values of prior year's benchmark and present the results in Columns 3 and 4 of Panel B. We find that the positive effect of |*ΔBENMAR_SIZE_PRCT*| on *CHG_BENMAR_TYPE* is only present among firms that exhibit *decreasing* benchmark values (*ΔBENMAR_SIZE_PRCT* < 0). This result indicates that, for firms with declining performance, |*ΔBENMAR_SIZE_PRCT*| strongly predicts switching to a new benchmark. However, for firms with improved performance (*ΔBENMAR_SIZE_PRCT* > *0*), the likelihood of changing benchmark type is not affected by the magnitude of benchmark size change.

Collectively, the results in Table 4 and the descriptive evidence in Table 3 show support for rejecting our H1. This result also highlights a potential discrepancy between auditors' practice and the guidance provided by ISA 320. While audit materiality benchmark choice is subject to professional judgment and ISA 320 does not prohibit a stronger tendency to adjust benchmark choices during periods of declining performance relative to periods of strong performance, it also does not explicitly advise auditors to base this choice on the direction of firms' performance changes. Our findings suggest that auditors may be more likely to adjust their benchmark choice during periods of declining performance. This raises the question of why such a pattern exists, and the relation between materiality benchmark type change and materiality value change during periods of declining performance versus strong performance.

4.1.1.2. Benchmark type change and the magnitude of materiality value change. In this section, we investigate the magnitude of changes in materiality value specifically through the lens of changes in benchmark type and examine whether benchmark type changes serve different purposes in the Pre and Post periods. We estimate the following OLS regression in model (2) on the client-firm level:

$$|DELTA_MAT| = \beta_0 + \beta_1 CHG_BENMAR_TYPE + \beta_2 POST + \beta_3 POST \times CHG_BENMAR_TYPE + \boldsymbol{\beta} Controls + FE + \epsilon_{i,t}, \quad (2)$$

where the dependent variable |*DELTA_MAT*| is the absolute value of the change in materiality amount from year *t-1* to year *t*, scaled by the materiality amount in year *t-1*. We use the absolute value because this analysis focuses on the relationship between benchmark change and the *magnitude* of materiality value change, which can be both upward and downward changes. The variables of interest are *CHG_BENMAR_TYPE* and the interaction term of *POST* and *CHG_BENMAR_TYPE*. We include all the controls in model (1) except for benchmark-related variables.

[17] ISA (UK) 320 states the following: "Profit before tax from continuing operations is often used for profit-oriented entities. When profit before tax from continuing operations is volatile, other benchmarks may be more appropriate, such as gross profit or total revenues".

[18] If we only use firms that use PBT-related benchmark type in year t-1, the results are similar to the results in Table 4 Panel B. Adding observations that use Asset-, Revenue- and Equity-related benchmarks does not qualitatively alter the results.

[19] Performance-related variables include: *BREAKEVEN, LOSS, PBTGROWTH, POSITIVE_STREAK, ROA, SMALLPROFIT*. These variables are used in some of the other tests, but not in this model.

Table 5
Benchmark type change and the magnitude of materiality value change.

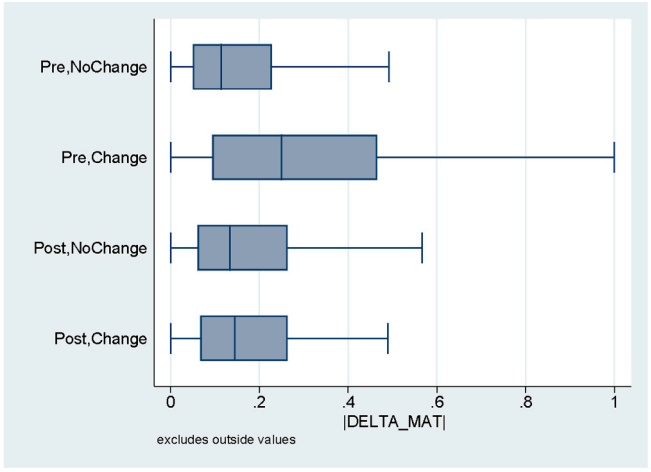
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				|*DELTA_MAT*|		
		Full Sample			Sample Split		
				Pre	Post	Pre	Post
CHG_BENMAR_TYPE	0.2026***	0.3898**	0.3837**	0.3942**	0.0922*	0.3946**	0.0708
	(2.61)	(2.08)	(1.99)	(2.06)	(1.65)	(1.99)	(1.40)
POST		0.0645***	0.0690***				
		(4.86)	(5.05)				
POST × CHG_BENMAR_TYPE		−0.3039	−0.3127				
		(−1.55)	(−1.57)				
LN_ASSETS	−0.0226**	−0.0257***	−0.0195**	−0.0064	−0.0485***	0.0031	−0.0449***
	(−2.48)	(−2.78)	(−2.05)	(−0.69)	(−2.97)	(0.32)	(−2.68)
LN_REVENUE	0.0122	0.0118	0.0139	−0.0103	0.0388	−0.0076	0.0391
	(0.94)	(0.89)	(1.10)	(−0.86)	(1.58)	(−0.73)	(1.60)
LN_ABS_PBT	−0.0009	0.0036	0.0056	0.0025	0.0040	0.0080	0.0031
	(−0.10)	(0.40)	(0.59)	(0.23)	(0.28)	(0.66)	(0.21)
AQC			0.0032			0.0071	−0.0023
			(0.20)			(0.42)	(−0.08)
NEW_AUDITOR			0.0394			0.0015	0.1054
			(1.07)			(0.04)	(1.36)
BUSY			−0.0042			0.0003	−0.0091
			(−0.27)			(0.01)	(−0.35)
GBP			−0.0480**			−0.0246	−0.0759**
			(−2.50)			(−1.25)	(−2.20)
KAM_N			−0.0040			−0.0067	−0.0010
			(−0.82)			(−1.13)	(−0.13)
PRICE_VOL			−0.0009*			−0.0005	−0.0014
			(−1.83)			(−1.10)	(−1.44)
RESTATEMENT_ANNOUNCE			0.0544			0.0403	0.0606
			(1.21)			(0.68)	(1.00)
BOARDSIZE			−0.0083			−0.0107	−0.0057
			(−1.52)			(−1.30)	(−0.76)
AC_INDEP			−0.0023**			−0.0031*	−0.0007
			(−2.03)			(−1.96)	(−0.54)
Constant	0.3662***	0.3578***	0.5830***	0.4227***	0.3591***	0.6669***	0.4806***
	(6.35)	(6.41)	(4.20)	(5.80)	(4.61)	(3.79)	(2.73)
Observations	1,840	1,840	1,840	1,007	833	1,007	833
R-squared	0.050	0.054	0.066	0.072	0.034	0.087	0.050
Year FE	YES	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES	YES
Audit firm FE	YES	YES	YES	YES	YES	YES	YES

Note: This table presents results from estimating model (2). The tests focus on examining the relationship between change of benchmark (*CHG_BENMAR_TYPE*) and the magnitude of the change in materiality value (|*DELTA_MAT*|) and whether the relationship changed during the Post period. In Columns (1) to (3), we use the full sample; in Columns (4) to (7), we present results based on the Pre and Post periods separately, with different control variables. Variable definitions are in the Appendix. Robust *t*-statistics in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

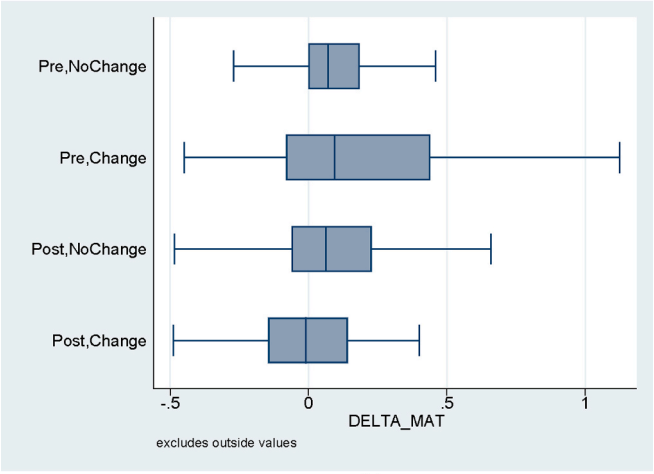
Table 5 reports the results of estimating model (2). Columns (1–3) show results for the full sample. The results in Column (1) show that *CHG_BENMAR_TYPE* is positively associated with |*DELTA_MAT*| on average. This result indicates that when auditors choose to alter benchmark type, the magnitude of materiality value adjustments (whether upward or downward) is larger than when there is no benchmark-type change. Columns (2) and (3) include the indicator variable *POST* and its interaction with *CHG_BENMAR_TYPE*. The results in Columns (2) and (3) suggest that benchmark type change is positively associated with the magnitude of materiality adjustment in the Pre- period, but such association is less pronounced in the Post-period than in the pre-period.[20] Columns (4–7) report the results for the Pre- and Post-period separately. We find that the benchmark type change is significantly and positively associated with |*DELTA_MAT*| in the Pre-period, while such association is weaker in the post-period. Our findings suggest that adjustments to the materiality benchmark served distinct purposes during the two periods.

Fig. 3 visually presents the relation between benchmark type change and materiality value changes for the two periods using boxplots. The figure splits the sample based on the presence or absence of benchmark type changes in the Pre and Post periods and visualizes the distribution of materiality changes within each group. Fig. 3A focuses on the magnitude of the change, irrespective of the sign of the change (upward or downward). We show that in the pre-period, benchmark type change is related to a larger magnitude of materiality value change (|*DELTA_MAT*|) than when there is no change in benchmark type. However, we do *not* observe a similar

[20] We note that the interaction terms in Columns (2) and (3) are not statistically significant at the conventional level. Nevertheless, the *t*-statistics are −1.55 and −1.57. Further results in Columns (4) – (7) provide clear evidence that the effect is more pronounced in the Pre period.



(a)



(b)

Fig. 3. Materiality value changes and benchmark changes in the Pre and Post Period. Note: Fig. 3A and 3B visually present the relation between benchmark change and materiality value changes in the Pre and Post period using boxplots. The graph splits the sample based on the presence or absence of benchmark changes in the Pre and Post period, and visualizes the distribution of materiality changes within each group. Fig. 3A focuses on the magnitude of the change (|*DELTA_MAT*|), irrespective of the sign of the change (upward or downward). In Fig. 3B, we focus on the actual value of *DELTA_MAT* to illustrate not only the magnitude of change in materiality value, but also the direction of the change (positive and negative).

pattern in the Post-period. Specifically, the magnitude of materiality value change appears to be very similar between those that changed benchmark type and those that did not change benchmark type.

In Fig. 3B, we focus on the actual value of *DELTA_MAT* to illustrate not only the magnitude of change in materiality value, but also the direction of the change (positive and negative). We observe that, among the four boxplots, the Pre-change group exhibits the most spread-out distribution, suggesting that, in the Pre-period, auditors alter benchmark type when needing larger adjustments in the materiality value. However, in the Post period, the boxplot for the change group and the no-change group do not exhibit distinct patterns. This result indicates, again, that auditors' benchmark type choice likely served different purposes before and after the outbreak of the pandemic.

4.1.2. Quantitative materiality value

In this subsection, we further test our H2 by estimating the following equation:

$$MAT_{i,t} = \beta_0 + \beta_1 POST + \delta Size + \boldsymbol{\gamma} OtherChar + FE + \epsilon_{i,t} \quad (3)$$

where the dependent variable represents the client's materiality level, measured as the quantitative materiality value in millions of British pounds (*MATERIALITY*) and quantitative materiality value scaled by total assets (*MAT_PRCT*). When the dependent variable is *MATERIALITY,* we follow Choudhary et al. (2019) and include the value of the three most common benchmarks related to firm size as independent variables: profit before tax (absolute value, *ABS_PBT*), revenue (*REVENUE*), and assets (*ASSETS*); in one specification, we

further add other firm-level characteristics as in model (2).[21] When the dependent variable is *MAT_PRCT*, we control for firm-level characteristics as in model (2). In some specifications, we include lagged materiality value (*MATERIALITY* and *MAT_PRCT*) to account for persistence in materiality decision.[22] The indicator for the Post period (*POST*) is the variable of interest. Finally, in different specifications, we include audit firm fixed effects, year fixed effects, and client industry (SIC-1-digit) fixed effects, which are noted at the bottom of the table.

In Table 6, Columns (1) and (2), the analysis focuses on the outcome of the auditors' materiality decision concerning the quantitative amount of materiality value in British pounds, not the path the auditor uses to reach this decision (Choudhary et al. 2019). Thus, we do not control for other firm-level characteristics. The coefficients on *ABS_PBT, REVENUE*, and *ASSETS* reflect the sensitivity of auditors' overall materiality judgments to each size variable, conditional on the other two, and without regard to other contextual factors. Overall, we find that *ABS_PBT*, *REVENUE*, and *ASSETS* are positively associated with the materiality values determined by the auditor. In line with Choudhary et al. (2019), our results show highly significant *t*-statistics and a very high R^2 (around 85 %), suggesting that most of the variation in the materiality amount can be explained by variations in firm size.

In Columns (3) to (5), we further add the *POST* indicator. Contrary to the expectations of the ICAEW, we do *not* find any significant difference between the materiality amounts in the two periods. Even more surprising, the coefficients are *positive* on *POST* in Column (3) and (4). In Column (3), the coefficient on *POST* is 2.025 ($t = 1.40$), suggesting that, on average, the materiality value in 2022 is 2.0 million pounds higher than the pre-COVID level (we note that this coefficient is not statistically significant). In Columns (6) and (7), where the dependent variable is scaled materiality (*MAT_PRCT*) and other firm-level characteristics are controlled for, we do not find evidence that the materiality value in the Post period is significantly different from the Pre period.

We also observe that firms' stock price volatility (*PRICE_VOL*) is negatively related to materiality amount. This is not surprising because firms with large stock price volatility tend to have higher business risk and misreporting risk, which requires a higher audit effort. Livne et al. (2024) show that risk areas are indicative of audit effort; consistent with their finding, we predict and find that the number of key audit matters (*KAM_N*) is negatively associated with the materiality level, which represents the extent of audit effort.

We note that not all firms/industries are negatively impacted by the pandemic,[23] and hence we split the sample by the client industry and by client performance, reported in Table 7, Panels A and B. The results in Panel A show some evidence that the materiality level (*MATERIALITY*) increased during the Post period in high-contact industries (Column 2, $p < 0.1$), but do not exhibit significant differences in other industries. Separate tests for firms with positive (Column 4) and negative sales growth (Column 5) in 2020 do not show significantly negative coefficients on *POST* for either type of firms. We find similar results in Panel B, where *MAT_PRCT* is the dependent variable. In the Online Appendix, Table OA1, we present the results controlling for lagged materiality value (*MATERIALITY* and *MAT_PRCT*) based on the same subsamples as in Table 7.

Overall, our results do not show support for rejecting our H2 and go contrary to the predictions of ICAEW in its materiality guidance for the pandemic, which expects a lower materiality value. These results also imply that while auditors have adjusted their choice of benchmark type during the pandemic period, they have retained materiality values similar to the pre-pandemic level.

4.1.3. Firm performance and asymmetric adjustments to materiality value

In section 4.1.1, we showed that auditors changed their benchmark type choice for materiality calculation at the onset of the pandemic. However, this shift in benchmark type choice coincided with firms' deteriorating performance and minimal changes in materiality value in the Post period, a pattern markedly different from the Pre period. In section 4.1.2, we further demonstrated that the overall materiality value in the Post period does not significantly differ from the Pre period. Given the heightened audit risk in the post-pandemic period and the substantial alteration in benchmark type by auditors, it is puzzling why materiality values remained unchanged.

In this section, we investigate potential explanations for this phenomenon. Specifically, we look at the sensitivity of materiality changes to performance change and examine whether such a relationship differs in the Pre compared to the Post period. We use sales growth as the measure of performance change for three reasons. First, sales represent firm size, which is a key determinant of materiality value. Second, sales are also related to firm profitability but are arguably more stable than income-related measures. Lastly, sales and its growth are what investors and analysts pay close attention to.[24] Thus, we run the following OLS regression as our model (4):

$$DELTA_MAT = \beta_0 + \beta_1 SALESGROWTH + \beta_2 NEG_SG + \beta_3 NEG_SG \times SALESGROWTH + \boldsymbol{\beta} Controls + FE + \epsilon_{i,t}, \quad (4)$$

where the dependent variable is *DELTA_MAT*, which represents the percentage change of materiality value from the previous year. The variables of interest are *SALESGROWTH* and the interaction between *SALESGROWTH* and an indicator variable for negative sales

[21] We note that in this model, we follow the approach by Choudhary et al. (2019). The dependent variable *MATERIALITY* and the three size variables, *ABS_PBT*, *REVENUE*, and *ASSETS* are expressed in the reported pound amount (in millions), rather than using the log transformation of these values. This is because the analysis focuses on the outcome of auditors' materiality assessments (the actual value in pounds) and how sensitive it is to the size of the most commonly used benchmarks.

[22] We sincerely appreciate the anonymous reviewer's suggestion of using scaled materiality as a dependent variable and controlling for lagged value.

[23] For instance, such firms as supermarkets, pharmaceutical companies, medical device manufacturers, and E-commerce companies could benefit from the pandemic.

[24] In untabulated results, we also use the growth in profit before tax as a performance measure, and we find similar results.

Table 6
Quantitative materiality value – baseline result.

Panel A	(1)	(2)	(3)	(4)	(5)	(6)	(7)
			MATERIALITY			*MAT_PRCT*	
REVENUE	0.0016***	0.0016***	0.0016***	0.0016***	0.0005***	0.0000**	0.0000**
	(6.03)	(6.17)	(6.16)	(6.08)	(3.11)	(2.00)	(2.05)
ASSETS	0.0002***	0.0002***	0.0002***	0.0002***	0.0000**	−0.0000	−0.0000
	(9.72)	(9.43)	(9.46)	(9.33)	(2.08)	(−0.96)	(−0.46)
ABS_PBT	0.0167***	0.0161***	0.0161***	0.0154***	0.0055***	−0.0000*	−0.0000
	(4.81)	(4.63)	(4.64)	(4.51)	(4.36)	(−1.93)	(−1.17)
POST (2020March-2022)			2.0253	1.5886	1.2225	−0.0258	0.0091
			(1.40)	(0.95)	(1.18)	(−0.95)	(0.55)
L.MATERIALITY					0.7923***		
					(14.98)		
L.MAT_PRCT							0.8535***
							(10.56)
AQC				0.2926	1.5242	−0.1207***	−0.0474***
				(0.12)	(1.36)	(−2.88)	(−2.82)
NEW_AUDITOR				0.3667	0.3733	0.0111	0.0406
				(0.16)	(0.24)	(0.19)	(1.21)
BREAKEVEN				5.9539*	1.5232	0.1194***	0.0055
				(1.88)	(1.02)	(2.81)	(0.37)
BUSY				−0.7043	0.1926	0.0700*	−0.0007
				(−0.59)	(0.38)	(1.95)	(−0.05)
GBP				−1.4897	−0.8927	−0.0315	−0.0272
				(−0.69)	(−0.96)	(−0.86)	(−1.48)
KAM_N				−0.6493	−0.9912***	−0.0664***	−0.0155***
				(−1.06)	(−3.19)	(−7.63)	(−3.19)
LOSS				−2.5956	−2.9349*	0.4965***	0.0723***
				(−0.92)	(−1.66)	(5.40)	(2.97)
PBTGROWTH				0.0600	−0.0553	0.0025	0.0022*
				(0.25)	(−0.38)	(0.71)	(1.92)
POSITIVE_STREAK				−0.9759	−1.3057	0.0281	−0.0380***
				(−0.65)	(−1.49)	(1.20)	(−2.98)
PRICE_VOL				−0.0800**	−0.0232	−0.0006	−0.0020***
				(−2.31)	(−1.35)	(−0.62)	(−4.55)
RESTATEMENT_ANNOUNCE				−9.3259***	−1.4902	−0.0271	−0.0226
				(−4.08)	(−1.64)	(−0.36)	(−0.84)
ROA				3.3604	7.7114**	3.9617***	0.6015***
				(0.34)	(2.13)	(6.45)	(3.39)
SALESGROWTH				−0.6621	0.4596*	−0.0346**	−0.0040
				(−1.62)	(1.88)	(−2.37)	(−1.16)
SMALLPROFIT				−13.1877***	−2.9284	−0.1117**	−0.0057
				(−2.71)	(−1.53)	(−2.33)	(−0.21)
BOARDSIZE				3.4049***	0.6078*	−0.0174***	−0.0013
				(6.62)	(1.86)	(−2.98)	(−0.38)
AC_INDEP				0.0378	−0.0215	0.0005	0.0001
				(0.93)	(−1.06)	(0.70)	(0.15)
Constant	10.1178***	11.4559**	10.3617**	−13.9365**	4.1979	0.5350***	0.1522
	(8.61)	(2.35)	(2.27)	(−2.16)	(1.21)	(3.22)	(1.31)
Observations	2,295	2,295	2,295	2,110	1,850	2,110	1,850
R-squared	0.849	0.856	0.856	0.860	0.963	0.365	0.871
Year FE	NO	YES	NO	NO	YES	NO	NO
Industry FE	NO	YES	YES	YES	YES	YES	YES
Audfirm FE	NO	YES	YES	YES	YES	YES	YES

Note: This table presents results from estimating OLS regression based on model (3) based on the full sample. In Columns (1)-(5), the dependent variable is quantitative materiality value in million British pounds (*MATERIALITY*), while in Columns (6) and (7), the dependent variable is scaled materiality, i.e., quantitative materiality value divided by total assets, times 100 (*MAT_PRCT*). Variable definitions are in the Appendix. Robust *t*-statistics in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

growth (*NEG_SG*). With this specification, we aim to capture how the materiality value changes with changes in sales and, more importantly, whether there is any asymmetric pattern when sales exhibit positive growth versus negative growth. We include essentially the same control variables in models (1) and (2). We do not control for some performance-related variables as in model (3) because these variables are related to sales growth and therefore are not appropriate to be included.[25]

[25] Specifically, we do not include *BREAKEVEN*, *LOSS*, *PBTGROWTH*, *POSITIVE_STREAK*, *ROA*, *SMALLPROFIT* in this model.

Table 7
Quantitative materiality value – cross-sectional tests.

Panel A	(1)	(2)	(3)	(4)	(5)
				MATERIALITY	
	FIR	High-Contact	Other firms	Positive Sales Growth in 2020	Negative Sales Growth 2020
REVENUE	0.0028***	−0.0022***	0.0003	0.0041***	0.0017***
	(7.74)	(−2.91)	(1.12)	(10.99)	(6.22)
ASSETS	0.0001***	0.0037***	0.0017***	0.0000**	0.0002***
	(3.61)	(3.58)	(9.06)	(2.18)	(10.38)
ABS_PBT	0.0275***	0.0211**	0.0088***	0.0168***	0.0123***
	(6.84)	(2.48)	(3.02)	(6.51)	(3.51)
POST (2020March-2022)	−1.1576	2.6345*	3.9678	2.0771	1.9883
	(−0.58)	(1.87)	(1.61)	(1.34)	(0.87)
Controls	YES	YES	YES	YES	YES
Observations	774	356	980	709	1,401
R-squared	0.910	0.868	0.910	0.880	0.878
Year FE	NO	NO	NO	NO	NO
Industry FE	YES	YES	YES	YES	YES
Audit firm FE	YES	YES	YES	YES	YES
Panel B.	(1)	(2)	(3)	(4)	(5)
				MAT_PRCT	
	FIR	High-Contact	Other firms	Positive Sales Growth in 2020	Negative Sales Growth 2020
REVENUE	−0.0000	−0.0000	0.0000	0.0000	0.0000*
	(−1.17)	(−1.05)	(1.50)	(0.31)	(1.80)
ASSETS	0.0000	−0.0000	0.0000	−0.0000***	−0.0000
	(0.17)	(−0.97)	(0.49)	(−4.01)	(−0.26)
ABS_PBT	0.0000	0.0001**	−0.0000**	−0.0000	−0.0000*
	(0.60)	(2.51)	(−2.16)	(−0.49)	(−1.73)
POST (2020March-2022)	−0.0291	−0.0178	0.0039	−0.0112	−0.0217
	(−0.87)	(−0.59)	(0.09)	(−0.51)	(−0.55)
Controls	YES	YES	YES	YES	YES
Observations	774	356	980	709	1,401
R-squared	0.454	0.733	0.456	0.615	0.376
Year FE	NO	NO	NO	NO	NO
Industry FE	YES	YES	YES	YES	YES
Audit firm FE	YES	YES	YES	YES	YES

Note: This table presents results from estimating OLS regression based on model (3). Panels A and B present results for different subsamples when the dependent variables are *MATERIALITY* and *MAT_PRCT*, respectively. The FIR subsample includes firms in the finance, insurance, and real estate industries. High-Contact group includes firms in industries that had the largest impact by COVID-19 according to the Office for National Statistics (UK). The control variables in all models are the same as in Column (4) of Table 6. Variable definitions are in the Appendix. Robust *t*-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 8 reports the results of estimating model (4). Column (1) shows that, on average, sales growth is *positively* associated with the growth of materiality. We then split the sample based on positive and negative sales growth in Columns (2) and (3), respectively. In Column (2), we present results for the sample with *negative* sales growth based on 685 observations. We show that the association between *SALESGROWTH* and *DELTA_MAT* is *negative* and *not* statistically significant (−0.1450, t = -1.27). We find a *positive* and significant association between sales growth and materiality change in Column (3) (0.0454, $t = 2.44$) based on 1,155 observations. In other words, these findings imply that auditors increase their materiality values when sales *increase* but do not *decrease* materiality values accordingly when sales decrease. Considering that a reduced materiality value necessitates more stringent audits, our findings beg the question of whether auditors have followed the auditing standards and applied professional judgments to the highest standards.

In Column (4), we add the indicator variable *NEG* and its interaction term with *SALESGROWTH*. We observe that the coefficient on *SALESGROWTH* is positive and significant, indicating that materiality value increases as sales increase. However, the coefficient on the interaction term *NEG_SG* × *SALESGROWTH*, which identifies the difference in the effect of *SALESGROWTH* when sales decrease, is negative and statistically significant, indicating that the positive association between *SALESGROWTH* and *DELTA_MAT* reverses when sales growth is negative. We acknowledge that increases and decreases in materiality amount may be asymmetric by nature because upward adjustments can be larger than 100 %, whereas downward adjustments cannot be lower than −100 %.[26] Thus, we remove the observations with an increase in materiality larger than 1 to account for such a mechanical relationship as a robustness test, and we still find consistent results (not tabulated for brevity).

In untabulated tests, we investigate whether the asymmetric materiality adjustment is a phenomenon that is only present in the

[26] Materiality value decreases are bounded at −1, as materiality value cannot drop lower than 0. However, materiality value increases could theoretically be higher than 1.

Table 8
Materiality value change and firm performance: bias toward upward adjustments.

	(1)	(2)	(3)	(4)
		DELTA_MAT		
	Full sample	Sample split by positive Sales Growth		Full sample
		Negative	Positive	
SALESGROWTH	0.0477***	−0.0145	0.0454**	0.0437***
	(5.28)	(−1.27)	(2.44)	(2.67)
NEG_SG				−0.1952***
				(−10.39)
NEG_SG × SALESGROWTH				−0.0589***
				(−2.66)
LN_ASSETS	−0.0082	0.0032	0.0058	0.0029
	(−0.86)	(0.33)	(0.39)	(0.30)
LN_ABS_PBT	0.0158*	0.0207**	−0.0072	0.0039
	(1.77)	(2.40)	(−0.52)	(0.43)
PRICE_VOL	−0.0016***	−0.0023***	−0.0015***	−0.0016***
	(−3.15)	(−2.59)	(−3.58)	(−4.56)
AQC	0.0228	0.0112	0.0038	0.0061
	(1.20)	(0.50)	(0.15)	(0.33)
NEW_AUDITOR	0.0426	−0.0359	0.0943*	0.0455
	(1.16)	(−1.30)	(1.73)	(1.30)
BUSY	−0.0060	−0.0109	−0.0187	−0.0175
	(−0.31)	(−0.57)	(−0.64)	(−0.92)
GBP	−0.0438*	−0.0553	−0.0384	−0.0483**
	(−1.92)	(−1.61)	(−1.28)	(−2.17)
KAM_N	−0.0106*	−0.0078	−0.0065	−0.0071
	(−1.81)	(−1.28)	(−0.70)	(−1.25)
RESTATEMENT_ANNOUNCE	0.0566	0.0298	0.1107	0.0742
	(1.16)	(1.03)	(1.39)	(1.56)
BOARDSIZE	−0.0103*	−0.0157***	−0.0099	−0.0108*
	(−1.82)	(−3.57)	(−1.12)	(−1.88)
AC_INDEP	−0.0022*	−0.0011	−0.0025	−0.0020
	(−1.75)	(−1.25)	(−1.44)	(−1.60)
Constant	0.4526***	0.1629	0.5245***	0.4653***
	(3.33)	(1.35)	(2.62)	(3.35)
Observations	1,840	685	1,155	1,840
R-squared	0.071	0.172	0.063	0.116
Year FE	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES
Audit Firm FE	YES	YES	YES	YES

Note: This table presents results from OLS estimation based on model (4). In column (1), we use the full sample. In columns (2) and (3), we split the sample into those with positive sales growth and those with negative growth. In column (4), the estimation is based on the full sample. Variable definitions are in the Appendix. Robust *t*-statistics in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Post period. We repeat the same analysis as in Table 8 and split the sample into two periods. The interaction term *NEG_SG* × *SALESGROWTH* in both periods are negative and statistically significant. This suggests that auditors have a potential bias for upward materiality adjustment even in normal periods. We also note that the effect is more pronounced during the pandemic. Taken together, the asymmetric pattern of materiality value adjustment echoes our finding that materiality value does not exhibit a significant change in the post-period. The Post period, especially the year 2020, is marked by a significant sales decrease for most firms (60 % of the firms). Since auditors are reluctant to adjust the materiality value downward when performance decreases, this may explain why materiality values are not adjusted downward during the pandemic periods.

To visualize the asymmetric pattern of materiality adjustment in relation to performance change, we use a scatter plot to depict the relationship between materiality changes (|*DELTA_MAT*|) and changes in sales (*SALESGROWTH*) in Fig. 4. To simplify interpretation, we plot the absolute value of materiality change so that all data points appear above the X-axis.[27] The blue circles on the right-hand side (where sales growth is positive) are more dispersed towards the upper right quadrant, whereas the red circles on the left-hand side (where sales growth is negative) are more tightly clustered near the X-axis. This visual pattern aligns with our regression analysis, highlighting the asymmetric nature of materiality adjustments: auditors are more likely to raise the materiality value during periods of strong performance but less inclined to lower it during downturns.

Overall, the results in Section 4.1 seem to indicate that during the post-period, auditors adjusted their choice of benchmark and materiality calculation processes, but the final outcome of the assessed materiality value is similar to the one they were using before the pandemic. This result deviates from the expectation that auditors would exert increased effort and professional judgment during heightened risk and information demands. In fact, our finding speaks directly to ICAEW's concern highlighted in the "COVID-19:

[27] We note that some firms have negative value of revenue, especially financial firms. This is why sales growth have values below −1.

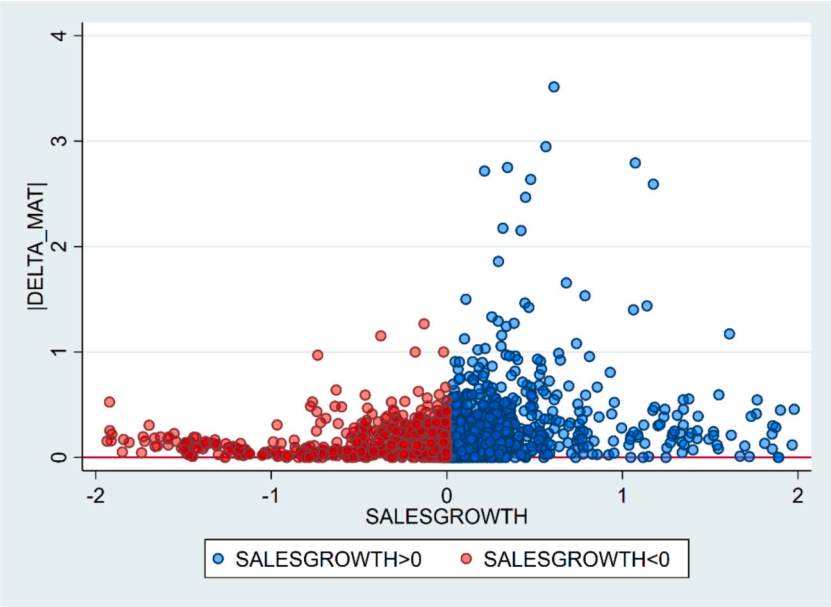


Fig. 4. Sales growth and materiality value change: the asymmetric pattern. Note: In this Figure, we use a scatter plot to depict the relationship between materiality changes (|*DELTA_MAT*|) and changes in sales (*SALESGROWTH*).

determining materiality" report. This report emphasizes that *"(a)n appropriate justification for a chosen benchmark would not be where it is done simply to avoid an increase in audit work as a consequence of a reduced materiality."* Although we cannot directly infer auditors' intentions for manipulating benchmarks in the Post period to preserve Pre-COVID materiality levels (in order to save audit effort), our results reveal compelling evidence that point strongly to this direction.[28]

4.2. The implications of materiality values on audit outcomes

In this section, we shift focus from the assessment of materiality to its impact on the audit outcomes. We investigate whether and how auditors' materiality amount relates to audit outcomes for the two periods. We run the following OLS regression (Logit for Going Concern tests):

$$AUDIT_OUTCOME = \beta_0 + \beta_1 MAT_PRCT + \boldsymbol{\beta} Controls + FE + \epsilon_{i,t}, \quad (5)$$

where the dependent variable *AUDIT_OUTCOME* is measured by *LN_AUDFEE*, *GOING_CONCERN*, or *DELAY* in different specifications. *LN_AUDFEE* is the natural logarithm of audit fees. *GOING_CONCERN* is an indicator variable equal to 1 if the firm receives a going concern opinion in the current year, otherwise 0. *DELAY* is the days between audit report signature date and the financial year end. This model is estimated using OLS regression when the dependent variable is *LN_AUDFEE* and *DELAY*, and Logit regression when the dependent variable is *GOING_CONCERN*. The variable of interest is *MAT_PRCT* (materiality amount scaled by total assets, times 100) and its interaction term with *POST*.

Table 9, Panel A, reports the results of audit fees. The results in Columns (1–2) suggest that *MAT_PRCT* is negatively associated with audit fees, which is in line with the expectation that more stringent audits (lower materiality values) require more audit efforts, and thus result in higher fees. This result is also consistent with Choudhary et al. (2019). In Column (3), we show that auditors charge significantly higher audit fees in the Post period, which is consistent with the univariate tests in Section 3.2 and contemporary studies by Al-Qadasi et al. (2022) and Harjoto and Laksmana (2022). In Column (4), we focus on the interaction term *POST* × *MAT_PRCT*. The interaction term is not statistically significant, suggesting that the relation between materiality level and audit fee pricing is not significantly different between the two periods.[29]

[28] This notion is further enhanced by our evidence on the number of key audit matters disclosed in audit reports. In the Pre and Post period, the mean value of *KAM_N* is 3.34 and 3.19, respectively. The mean value is statistically and significantly different (p<5 %). We acknowledge that the economic significance is limited; but, if anything, this result suggests that auditors exert *less* effort in the Post period, and it goes in line with our finding regarding materiality assessment: in the Post period, auditors do not seem to exert more audit effort by lowering the materiality value. Rather, they use switching benchmark type to justify a materiality level similar to pre-pandemic time.

[29] In the Online Appendix, Table OA2, we tabulate results based on the same model specification as in Table 8, Panel A, with lagged audit fee as an additional control variable. The results on the interaction term *POST* × *MAT_PRCT* remain statistically insignificant. We appreciate the anonymous reviewer for this suggestion.

Table 9
Materiality value and audit outcomes.

Panel A: Audit fees	(1)	(2)	(3)	(4)
		LN_AUDFEE		
MAT_PRCT	−0.2415***	−0.0616**	−0.0604**	−0.0555**
	(−4.56)	(−2.14)	(−2.06)	(−2.19)
POST			0.3875***	0.4000***
			(10.86)	(8.10)
POST × *MAT_PRCT*				−0.0193
				(−0.32)
Observations	2,110	2,110	2,110	2,110
R-squared	0.716	0.805	0.803	0.803
Year FE	YES	YES	NO	NO
Industry FE	YES	YES	YES	YES
Audit firm FE	YES	YES	YES	YES
Firm size control	YES	YES	YES	YES
Other characteristic controls	NO	YES	YES	YES
Panel B: Going concern opinion				
		GOING_CONCERN		
MAT_PRCT	−1.9090**	−0.9255	−0.8719	−0.0867
	(−1.98)	(−0.80)	(−0.77)	(−0.11)
POST			0.4879	1.2578
			(1.07)	(1.30)
POST × *MAT_PRCT*				−1.6143
				(−0.70)
Observations	2,040	2,040	2,040	2,040
Year FE	YES	YES	YES	NO
Industry FE	YES	YES	YES	YES
Audit firm FE	YES	YES	YES	YES
Firm size control	YES	YES	YES	YES
Other characteristic controls	NO	YES	YES	YES
Pseudo R^2	0.131	0.324	0.305	0.310
Panel C: Audit delays				
		DELAY		
MAT_PRCT	−0.9513***	−0.8767**	−0.8653**	−0.7638*
	(−2.74)	(−2.24)	(−2.21)	(−1.85)
POST			3.5990***	3.8599***
			(4.81)	(4.40)
POST × *MAT_PRCT*				−0.4042
				(−0.53)
Observations	2,110	2,110	2,110	2,110
R-squared	0.115	0.164	0.161	0.161
Year FE	YES	YES	YES	NO
Industry FE	YES	YES	YES	YES
Audit firm FE	YES	YES	YES	YES
Firm size control	YES	YES	YES	YES
Other characteristic controls	NO	YES	YES	YES

Note: In this table, we examine the relationship between materiality values and audit outcomes based on model (5). Model (5) is estimated using OLS regression in Panel A and Panel C, and Logit regression in Panel B. All estimations control for *LN_ABS_PI* and *LN_REVENUE*, which represent firm size, in each column. In Columns 2–4, we add other firm level characteristics that have been used in model (3), including: *AQC, NEW_AUDITOR, BREAKEVEN, BUSY, GBP, KAM_N, LOSS, PBTGROWTH, POSITIVE_STREAK, PRICE_VOL, RESTATEMENT_ANNOUNCE, ROA, SALESGROWTH, SMALLPROFIT, BOARDSIZE, AC_INDEP.* All estimations use the full sample. Variable definitions are in the Appendix. Robust *t*-statistics in parentheses for panels A and C; robust *z*-statistics in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

The results of going concern opinions are presented in Table 9, Panel B. The coefficient on *MAT_PRCT* in Column (1) is significantly negative, suggesting that materiality level is negatively associated with the propensity to issue going concern opinion. The interaction term *POST* × *MAT_PRCT* in Column (4) is not statistically significant, suggesting that the effect of materiality level on the propensity to issue going concern opinion is not different in the two periods. In untabulated tests, we focus on financially distressed firms,[30] and the results remain qualitatively similar. While our logit regression reveals a significant association between materiality value and the propensity to issue going concern opinions, it is important to acknowledge that this suggests a correlation, not causation. It is plausible that auditors set lower materiality values for firms at higher risk of going concern. Therefore, we urge caution in drawing strong conclusions about the impact of materiality value on audit quality or financial reporting quality, because the observed association may

[30] We define a firm as experiencing financial distress if it meets one of the following criteria: (1) negative profit before tax (PBT), (2) negative sales growth, or (3) negative PBT growth.

be driven by the influence of going concern risk on auditors' materiality assessments. We would like to draw attention to the interaction term, which suggests that the association between materiality value and the propensity to issue going concern opinion does not exhibit significant differences in the post period compared to the Pre period.

Table 9, Panel C reports the results for audit delay tests. We show that, for the full sample in Columns (1) and (2), *MAT_PRCT* is negatively associated with audit delay (*DELAY*). This is in line with the expectation that more stringent audits (lower materiality values) take longer time to finish. In Column (3), we add the time indicator *POST*, which is positive and statistically significant, suggesting that auditors on average needed longer to finish the audit work during the pandemic period.[31] Column (4) focuses on the interaction term *POST* × *MAT_PRCT*. We do not find evidence that the negative relation between *MAT_PRCT* and *DELAY* is more pronounced in the Post period.[32]

Taken together, across our analyses examining the relationship between materiality values and audit outcomes, we observe no significant differences during the pandemic period.

5. Conclusion and discussion

This paper analyzes how auditors' materiality assessment responded to the COVID-19 pandemic. Focusing on the actual materiality disclosure by FTSE 350 firms in the UK, we find that auditors altered their materiality benchmark type during the pandemic, but not the materiality level. The lack of change in materiality value may be linked to an asymmetric pattern in auditors' materiality judgments. While declining (improved) performance is associated with a higher likelihood of changing benchmark type (increased materiality value), it is not associated with significant reductions in materiality values (increase in the likelihood of benchmark type change). Further, we also present compelling evidence suggesting that auditors may have strategically used benchmark type change during the pandemic to preserve the pre-pandemic materiality value, which is a concerning practice that contradicts recommendations by the ICAEW. Future studies that dive deeper into the obstacles that auditors faced during the pandemic may provide further insights into why auditors did not make significant changes to the materiality value assessments.

Our research offers actionable insights for regulators such as the ICAEW, FRC, and PCAOB. Specifically, it highlights that shifts in benchmarking practices—particularly in response to declining performance—may indicate reduced audit effort. Monitoring such changes could therefore serve as a useful diagnostic tool to flag audits that may require further scrutiny. These findings support ongoing regulatory efforts to improve transparency and strengthen oversight of key audit judgments.

Finally, we find that the relationship between materiality values and audit outcomes remains unchanged during the pandemic. Our study extends the literature on auditor materiality assessment and the relation between audit judgments and audit outcomes. The implications of this study should be useful for practitioners, policymakers, and academics in better understanding the audit process. We also acknowledge that we lack good measures for audit and reporting quality. Future studies that use restatement data or proposed audit adjustments (Choudhary et al. 2019) will shed further light on the impact of materiality value on audit/reporting quality during the pandemic period.

Our study is also subject to several other limitations. First, even though we show strong evidence that auditors responded to the macroeconomic shocks caused by the COVID-19 pandemic, we do not speak to the adequacy of such responses. Second, our sample is limited to listed firms in the UK, where companies follow principle-based accounting standards (IFRS). Auditors' materiality assessment may differ in other settings, such as the United States, where auditors follow PCAOB auditing standards, the litigation risk is higher (Seetharaman, Gul, and Lynn 2002), and a more rules-based accounting standard (US GAAP) is applied. Future research using data from other jurisdictions may find that auditors respond differently to major crises such as the COVID-19 pandemic. Further, our sample is relatively small, especially for non-Big 4 audits. Future studies employing more data for non-Big 4 firms may provide important insights into the kerfuffle about audit quality differences between Big 4 and non-Big 4 firms. Finally, our sample period ends in 2022, which prohibits us from examining whether and to what extent the differences that we find in this study will persist. Future studies on this issue should provide important insights into audit practice in the post-pandemic era.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

[31] During the Post period, the audit reporting days was only about 4 days on average longer than before. In the Pre period, the median (mean) reporting days was 60 (62.7) days, and for the Post period, the median (mean) reporting days was 64 (66.3) days. We observe that 2020 had the longest delays, with the median (mean) days of 66 (67). This suggests that, on average, it took about 6.7 % longer to issue the audit report in the Post period, and 10 % longer in year 2020. We acknowledge that this is not a dramatic increase and much less than the 2–3 month extension given by FRC. This result is also consistent with our finding on materiality assessment in the previous section: in the Post period, auditors do not seem to exert more audit effort by lowering the materiality value. Rather, they use switching benchmark type to justify a materiality level similar to pre-pandemic time, and they report less key audit matters (see footnote 28 for more discussion on KAM).

[32] We do note, however, that when we use the natural log of materiality amount as the independent variable, its interaction term with *POST* is negative and statistically different at 1 %. This may provide some evidence suggesting that the implications of materiality amount on audit delay are different in the Pre period.

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Appendix A

Appendix:. Variable Definition Table

Dependent variables	
MATERIALITY (£)	The amount of quantitative materiality value reported by firm *i* in year *t* (in million British pounds).
MAT_PRCT	The amount of quantitative materiality divided by total assets for firm *i* in year t, times 100.
CHG_BENMAR_TYPE	Indicator variable equals 1 if the materiality benchmark used by auditor is different from the previous year, 0 otherwise.
DELTA_MAT	The value of the percentage change of materiality amount from year t-1 to year *t*, for firm *i*.
|DELTA_MAT|	Absolute value of the percentage change of materiality amount from year t-1 to year *t*, for firm *i*.
LN_AUDFEE	Natural logarithm of audit fee for firm *i* in year *t*.
GOING_CONCERN	Indicator variable equals 1 if the auditor issued a Going Concern opinion for firm *i* in year *t*, otherwise 0.
DELAY	The number of days between the signature date of the audit report and the financial period end.
Key independent variables	
POST	The indicator variable is equal to 1 if the firm's financial statement period ends after (and including) March 2020, otherwise equal to 0.
|ΔBENMAR_SIZE_PRCT|	The absolute value of percentage change in the value of prior year's benchmark from year *t-1* to *t*.
NEG_ΔBENMAR	Indicator variable set to 1 if the value of prior year's benchmark decrease in year *t* relative to year *t-1*, otherwise 0.
NEG_SG	Indicator variable set to 1 if the firm has negative sales growth in year *t*, otherwise 0.
Control variables	
REVENUE (£)	Total revenue (revt) of firm *i* in year *t* (in million pounds).
ASSETS (£)	Total assets (at) of firm *i* in year *t* (in million pounds).
ABS_PBT (£)	Absolute value of Profit Before Tax (PBT, pi) of firm *i* in year *t* (in million pounds).
LN_ASSETS	Natural logarithm of total assets (at) for firm *i* in year *t*.
LN_REVENUE	Natural logarithm of total revenue (revt) for firm *i* in year *t*. For firms with negative revenue, we take the absolute value of revenue.
LN_ABS_PBT	Natural logarithm of the absolute value of Profit before Tax (PBT, pi) for firm *i* in year *t*.
AC_INDEP	Audit Committee Independence (Percentage of independent board members on the audit committee as stipulated by the company. (CGBFO01V)
AQC	Indicator variable, equal to 1 if the acquisition cash flow (AQC) item in Compustat Global is not missing or 0, otherwise 0.
NEW_AUDITOR	An indicator is set to 1 if the firm has a new auditor in year *t*, otherwise 0.
BOARDSIZE	The number of board members at the end of the fiscal year (CGBSDP060).
BREAKEVEN	Following Choudhary et al. (2019), this indicator is set to 1 if either (1) EPS is between −£0.05 and £0.05 or (2) if the current period pretax income (PBT) is less than 25 % of the three-year historical average of pretax income, and 0 otherwise.
BUSY	Indicator variable equal to 1 if the financial year ends in December, otherwise 0.
GBP	Indicator variable, equal to 1 if the reporting currency is British Pounds, otherwise 1.
KAM_N	Number of key audit matters in the audit report.
LOSS	Indicator variable equal to 1 if firm *i* has negative profit in year *t*.
PBTGROWTH	Profit before tax (pi) of year t minus profit before tax of year *t-1*, divided by profit before tax of year *t-1*.
POSITIVE_STREAK	An indicator is set to 1 if the change in income before extraordinary items (ib) for the last three years is greater than zero, and 0 otherwise..
PRICE_VOL	Daily stock price volatility for the 1 year prior to the financial statement closing date.
RESTATEMENT_ANNOUNCE	Indicator variable equals 1 if firm *i* in year *t* announced restatement for previous years' financial statements, otherwise 0.
ROA	Return on assets, calculated as Income before Extraordinary Items (ib) divided by beginning total assets (at).
SALESGROWTH	Revenue (revt) of year *t* minus revenue of year *t-1*, divided by revenue of year *t-1*.
SMALLPROFIT	Indicator variable set to 1 if the return on assets (*ROA*) is between 0 % and 1 %, and 0 otherwise.

Note: Variable names from Compustat and Datastream are in brackets. Only *BOARDSIZE* and *AC_INDEP* are from Datastream.

Appendix B. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jaccpubpol.2025.107355

Data availability

The data on materiality is manually collected by the authors' research team.

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