

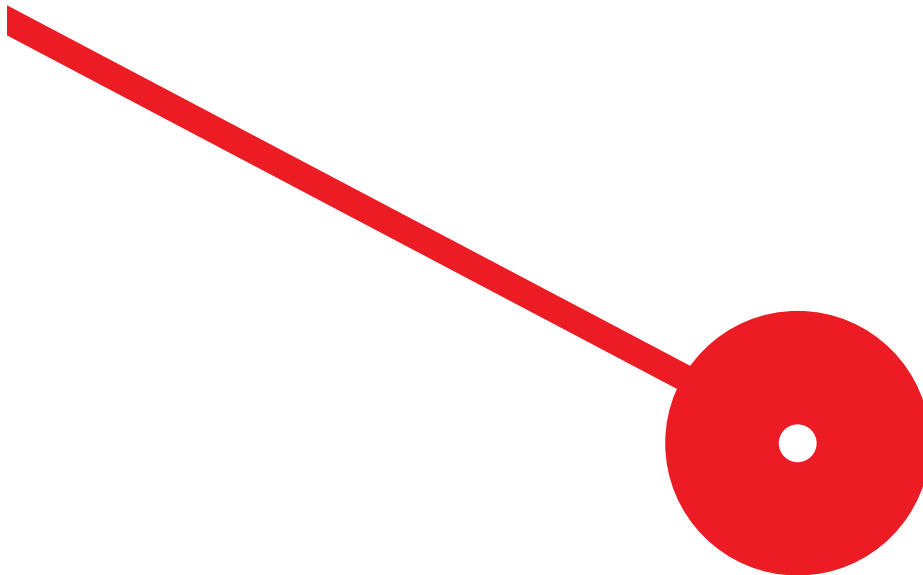
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COVID-19's Impact on
Defining Materiality
Liliana Carvalho

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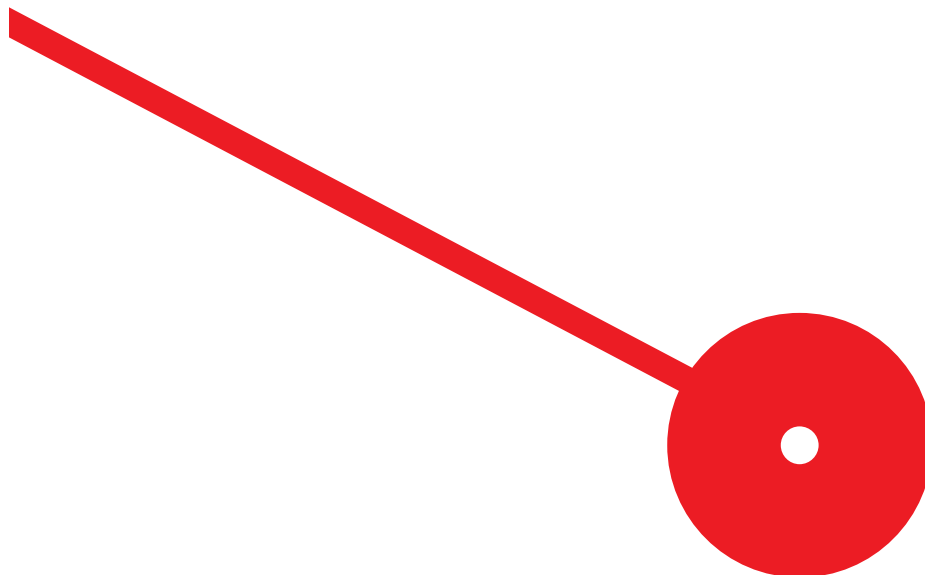
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Auditoria

COVID-19's Impact on Defining Materiality

Liliana Carvalho

**Dissertação de Mestrado apresentado ao
Instituto Superior de Contabilidade e
Administração do Porto para a obtenção do grau
de Mestre em Auditoria., sob orientação da
Professora Doutora Isabel Maldonado e
Professora Doutora Amélia Ferreira da Silva**



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Abstract

This study examines how the COVID-19 pandemic influenced the definition of materiality reported in the audit reports of publicly listed companies in the United Kingdom. The sample comprises firms included in the FTSE 100 index between 2015 and 2024, allowing for the distinction between the pre-pandemic, pandemic, and post-pandemic contexts. Materiality information was collected directly from audit reports, while the remaining variables were obtained from the Refinitiv Datastream database.

The dependent variable corresponds to the natural logarithm of disclosed materiality, normalized by total assets ($\ln(OM/TA)$). The main independent variable is a composite risk index (*Risk_Index*), constructed from proxies of leverage, losses, ROA volatility, and liquidity. Control variables include firm size, profitability, audit firm (*BIG4*), and governance (board independence). Models were estimated with firm and year fixed effects, using robust standard errors and additional robustness tests.

The results show a negative and statistically significant association between risk and materiality, suggesting that riskier firms tend to adopt more conservative materiality. Similarly, firm size is associated with lower materiality, while profitability exerts a positive effect. Board independence also shows a negative effect, though of smaller magnitude, and the *BIG4* variable has no significant impact. In the context of the pandemic, no systematic reductions in materiality were observed; instead, selective adjustments emerged, particularly related to leverage and COVID-specific variables.

Overall, the findings confirm that auditors are sensitive to risk and to firms' structural characteristics, but in a systemic shock context, the response consisted mainly of adjusting benchmarks and reference criteria rather than directly reducing materiality levels. These conclusions contribute to the academic and regulatory debate on the application of ISA 320 and reinforce the need for greater transparency in the choice of benchmarks and in the disclosure of materiality ranges.

Keywords: Materiality; Auditing; Materiality benchmarks; COVID-19; Auditor's report; United Kingdom.

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List of Abbreviations

BIG4 – The four largest international audit firms

FRC – Financial Reporting Council

GDP – Gross Domestic Product

IAASB – International Auditing and Assurance Standards Board

ISA – International Standards on Auditing

PCAOB – Public Company Accounting Oversight Board

PBT – Profit Before Tax

CHAPTER I – INTRODUCTION

1 Introduction

1.1 Context and Motivation

Financial auditing plays a crucial role in strengthening confidence in capital markets by ensuring the reliability of the information disclosed by entities. Among its core concepts, materiality holds particular significance, as it defines the threshold above which a misstatement or omission may influence the economic decisions of users of financial statements, the stakeholders. This inherently professional judgment not only guides the extent and depth of audit procedures but also informs the final evaluation of the financial statements (IAASB, 2019, ISA 320).

Materiality has a direct impact on the credibility and usefulness of the financial information provided to various stakeholders (Christensen et al., 2020; Quick et al., 2023). By establishing the threshold above which misstatements or omissions are likely to affect economic decisions, the auditor's professional judgment regarding materiality accompanies all stages of the audit process, from risk assessment to the formulation of the final opinion (IAASB, 2019, ISA 320).

Given the importance of materiality throughout the audit process, prior to the revision of International Standard on Auditing (ISA) 700, there was a recurring concern among users of financial statements, who requested that auditors disclose the quantitative thresholds of materiality in audit reports (Mock et al., 2013; Carcello et al., 2011).

In response to this growing demand from investors for greater transparency in the audit process, the Financial Reporting Council (FRC) in the United Kingdom introduced, on 30 September 2013, new requirements applicable to company audit reports (Quick et al., 2023; Dwyer et al., 2023). ISA 700 was subsequently amended to require auditors to explain how they applied the concept of materiality in planning and performing the audit (IAASB, 2019). This includes the disclosure of the materiality threshold applied to the financial statements as a whole, which was not previously a mandatory practice. This requirement aims to provide users with a better understanding of the expected level of precision in financial statements and how audit decisions are informed by these thresholds. Studies such as Quick et al. (2023) show that Profit Before Tax (PBT) is the most commonly used benchmark, justified by its consistency with key performance

indicators (KPIs) and its ability to eliminate volatility, thereby providing a more accurate representation of financial performance.

Beyond the disclosure of materiality, ISA 700 (IAASB, 2019) suggests five additional points that auditors may include in their explanation: (i) the threshold or thresholds of materiality for those classes of transactions, account balances, or disclosures where such materiality levels are lower than the materiality for the financial statements as a whole (as described in paragraph 10 of ISA 320); (ii) performance materiality (as described in paragraph 11 of ISA 320); (iii) any significant revisions to materiality thresholds made as the audit progressed; (iv) the threshold used for reporting unadjusted differences to the audit committee; and (v) significant qualitative considerations related to the auditor's assessment of materiality (FRC, 2013).

Despite the regulatory strengthening and the increasing demand for transparency in materiality reporting, the emergence of unexpected crises has exposed the limits of existing norms. The COVID-19 pandemic (2020–2021) represented an unprecedented shock to audit practice, heightening uncertainty and intensifying scrutiny over professional judgments (Haddad et al., 2023; Widyadhana & Feliana, 2023). Restrictions on mobility, high economic volatility, and increased going-concern risks required substantial adjustments to audit procedures, planning, and materiality determination (Brissman & Watson, 2023; Newton et al., 2023). However, recent empirical evidence suggests that, despite heightened perceived risk, quantitative materiality thresholds were rarely significantly reduced, indicating a possible disconnect between the level of risk and the materiality values adopted (Brissman & Watson, 2023).

Although progress has been made in the literature regarding the identification of materiality determinants (Choudhary et al., 2019; Kend & Nguyen, 2023), an important research gap remains: it is still unclear how auditors adjust materiality thresholds in response to sudden increases in risk, such as health or financial crises, and whether these adjustments align with normative guidelines or instead reflect institutional pressures and operational constraints (Zhu et al., 2024; Dwyer et al., 2023). This gap provides the foundation for the present study, which seeks to empirically analyse the relationship between risk and materiality in times of crisis.

1.2 Research Problem

Although materiality is a central concept in the audit process, its determination still largely relies on the auditors' subjective judgment. While international standards (ISA 320 and ISA 700) have sought to enhance transparency through the disclosure of the criteria adopted, audit reports reveal heterogeneous practices across firms and jurisdictions (Quick et al., 2023; Dwyer et al., 2023).

The available empirical literature also presents a fragmented and inconclusive picture. Classical studies, such as Blokdijk et al. (2003), identify an inverse relationship between financial risk (e.g., leverage, losses) and materiality. Subsequent large-scale investigations, such as Choudhary et al. (2019), document significant variations in the choice of benchmarks and percentages, suggesting that higher materiality levels may increase residual audit risk. More recent studies, including Quick et al. (2023) and Dong et al. (2024), present asymmetric evidence: in some contexts, auditors adjust materiality thresholds in response to risk, whereas in others, they choose to maintain stable materiality levels and compensate for risk through additional testing.

The impact of the COVID-19 pandemic further intensified this lack of consensus. Brissman and Watson (2023) and Newton et al. (2023) report that, despite the increase in perceived risk, materiality values were rarely reduced, raising doubts about the effective connection between risk and materiality in times of crisis. Similarly, international studies (Zhu et al., 2024) show that higher materiality levels may undermine audit quality, particularly in firms with greater tendencies toward earnings management.

Thus, the research problem lies in the absence of robust and convergent evidence on how auditors adjust materiality in response to different levels of risk, especially in contexts of heightened uncertainty. This academic fragmentation underscores the relevance of deepening the empirical study of the relationship between risk and materiality, thereby contributing to the understanding of one of the most critical and least standardised judgments in audit practice.

1.3 Objectives and Research Questions

The COVID-19 pandemic (2020–2021) represented a shock of uncertainty that tested this framework: perceived risks increased, yet proportional reductions in materiality levels were not always observed. This context motivates our central question:

to what extent does business risk translate, in practice, into more conservative materiality thresholds, and how did the pandemic alter this tendency?

Consequently, this study seeks to assess the influence of corporate risk on the materiality threshold defined by auditors in listed companies, aiming to understand how this professional judgment relates to different dimensions of risk. The research focuses on the United Kingdom (2015–2024), where mandatory disclosure creates a unique environment for empirical analysis.

In addition, the study aims to examine whether the COVID-19 pandemic, as an exogenous shock of uncertainty, significantly altered this relationship, requiring auditors to reconsider the criteria traditionally used in determining materiality. Based on this framework, the following research questions are defined:

Q1: What is the relationship between risk proxies (financial, performance, and liquidity) and the materiality threshold defined by auditors?

Q2: Were there significant changes in this relationship during the COVID-19 pandemic period?

1.4 Expected Academic and Practical Contributions

This research seeks to make a significant contribution to the academic and professional debate surrounding audit transparency and quality by empirically analysing the relationship between corporate risk and materiality within the context of the United Kingdom, a jurisdiction that pioneered the public disclosure of materiality in audit reports. This analysis is particularly relevant because existing literature remains fragmented and inconclusive regarding how auditors adjust materiality in response to risk, especially in situations of heightened uncertainty such as the COVID-19 pandemic. By empirically mapping these judgments, the study contributes to clarifying practices and enriching the theoretical discussion on the role of materiality in the audit process.

Using observable materiality data disclosed in UK audit reports (2015–2024), this research evaluates whether (and when) higher risk is associated with more conservative materiality levels, and whether COVID-19 altered the relationship between risk and materiality. In addition, the study explores institutional and operational mechanisms, such as the choice of benchmark (GAAP vs non-GAAP), that may dampen adjustments to materiality despite increased risk. GAAP benchmarks refer to standard accounting

metrics, such as profit before tax or total assets, defined by recognised accounting standards; non-GAAP benchmarks correspond to adjusted or alternative measures (such as adjusted EBITDA or revenues) that exclude non-recurring or non-cash items to better reflect operational performance.

Beyond the academic contribution, the expected results also have a practical dimension, both regulatory and professional. First, the study tests whether the transparency required in the UK (disclosure of materiality thresholds, benchmarks, and rationale) translates into an effective alignment between risk and materiality under conditions of extreme shock. The findings may provide insights into whether the amendments to ISA 320 and the disclosure guidance offer regulators useful evidence regarding the effectiveness of international standards, testing whether these are adequate under extreme-risk contexts or whether they require additional guidance concerning the determination of materiality during periods of crisis.

Second, by mapping practical determinants (size, profitability, risk, and benchmark choices) and their relationship with audit effort (fees), this study offers useful evidence for internal methodologies and audit planning. The results may assist audit firms in defining and adjusting their internal methodologies, promoting greater consistency between perceived risk and adopted materiality levels. Finally, by enhancing transparency regarding the criteria applied by auditors, this research contributes to strengthening users' confidence in published financial statements.

1.5 Structure of the Dissertation

This dissertation is organised progressively into different chapters, each with specific objectives that, collectively, enable a comprehensive response to the proposed research questions. The first part introduces the topic, emphasising the relevance of financial auditing and, in particular, the role of materiality within the audit process. It also defines the research problem, outlines the objectives to be achieved, and presents the expected contributions, both academic and practical.

The second part consists of a literature review that brings together the main academic and regulatory developments on auditing, materiality, and risk. This section explores the evolution of the audit concept, the definition and methods of determining materiality, the different types of risk, and how these interact with materiality assessment.

It also analyses the impact of the COVID-19 pandemic on audit processes, culminating in the identification of research gaps that justify the relevance of the present investigation.

Building upon this discussion, the theoretical framework is then presented, highlighting contributions from agency theory, information asymmetry theory, and institutional theory, which collectively support the formulation of the research hypotheses. These hypotheses guide the subsequent empirical analysis and provide a clear structure for testing the proposed objectives.

The methodology chapter describes the empirical strategy adopted, including the characterisation of the sample and period of analysis, the procedures for data collection and processing, the definition of dependent, independent, and control variables, and the econometric model employed. Methodological limitations are also discussed, along with the robustness tests conducted to ensure the consistency and reliability of the results.

Subsequently, the results of the empirical analysis are presented, evaluating the relationship between risk and materiality and highlighting the differentiated effects of the COVID-19 pandemic. These findings are then subject to a critical discussion, contrasting them with existing literature and emphasising both theoretical and practical implications, as well as areas of convergence and divergence with prior studies.

The dissertation concludes with the presentation of the main findings, summarising the study's contributions to academic literature, auditing practice, and regulation. The limitations of the research are also acknowledged, and potential avenues for future research are suggested to further deepen the understanding of the relationship between risk and materiality in contexts of heightened uncertainty.

CHAPTER II – LITERATURE REVIEW

2 Literature Review

2.1 Auditing

2.1.1 Concept of Auditing

The concept of auditing is both ancient and dynamic, dating back to periods prior to the Christian Era and having evolved continuously over time.

The word “audit” originates from the Latin verb “*audire*”, meaning “to hear.” This term dates back to Ancient Rome, where auditors (“*auditore*”) had a single role: to listen to the public statements made by taxpayers regarding the results of their business activities and the taxes owed (Hayes et al., 2005).

There are, however, several definitions of auditing. One widely accepted definition states that: “Auditing is an examination of the operations, activities, and systems of an entity in order to verify whether they are carried out or operate in accordance with certain objectives, budgets, rules, and standards.” (Online INTOSAI Glossary of Auditing Terminology, n.d.)

Today, the primary objective of auditing is the expression of an opinion on the financial statements by a competent and independent professional, the auditor. The auditor’s opinion on the financial statements addresses whether the financial statements are prepared, in all material respects, in accordance with the applicable financial reporting framework (IAASB, 2019, ISA 200, A1).

2.1.2 Audit Process

The audit process, as established by the International Standards on Auditing (IAASB, 2021), is structured into several essential stages.

Initially, the process begins with client acceptance and continuance, during which the integrity of the entity, the associated risks, and the contractual conditions are evaluated. This step also involves analysing potential conflicts of interest and assessing the auditor’s independence. Following this evaluation, the terms and conditions of the engagement are formalised through an engagement letter, which defines the responsibilities of both the auditor and the client (IAASB, 2019, ISA 210 and ISA 220).

The next stage involves audit planning, where the objectives, scope, and overall approach of the engagement are determined, taking into account the nature and

complexity of the entity. At this phase, it is crucial to gain an understanding of the entity and its environment, including an assessment of internal control, governance structure, and the economic, legal, and regulatory factors that affect it (IAASB, 2019, ISA 300 and ISA 315). A key aspect of planning is the definition of materiality, that is, the threshold above which the omission or misstatement of information in the financial statements could influence stakeholders' decisions (IAASB, 2019, ISA 320).

The following stage consists of risk identification and assessment, in which potential risks of material misstatement, whether due to error or fraud, are analysed, as these may compromise the reliability of the financial statements. To this end, the audit team meets to share understanding and plan responses to these risks, which are documented to identify areas requiring greater attention (IAASB, 2019, ISA 240 and ISA 315).

Based on the identified risks, responses to assessed risks are defined. These may include substantive procedures, such as tests of details, tests of controls to assess the effectiveness of internal systems, and analytical procedures, such as comparative or trend analyses to detect unexpected variations (IAASB, 2019, ISA 330).

During the execution phase, sufficient and appropriate audit evidence is collected to support the auditor's conclusions, always based on the materiality established during planning. This evidence may be obtained through methods such as document and asset inspection, external confirmations with third parties, reperformance of processes, and direct observation (IAASB, 2019, ISA 320, ISA 500, and ISA 505). As the audit progresses, procedures are adjusted in response to newly identified information or emerging risks.

Documentation is an essential element throughout the entire process. The auditor must record all activities performed, the conclusions reached, and the rationale for professional judgments made. The so-called working papers provide the basis for review, validation of the work performed, and evidence of compliance with applicable auditing standards (IAASB, 2019, ISA 230).

Finally, in the conclusion and reporting stage, a final evaluation is performed to assess whether the evidence obtained is sufficient and appropriate and whether the conclusions are consistent with the initial objectives. The auditor then forms an opinion on whether the financial statements are fairly presented. Depending on the results, the

auditor may issue an unmodified opinion (financial statements are fairly presented) or, in the case of significant deviations or limitations in the audit work, a modified opinion, which may be qualified, adverse, or a disclaimer of opinion (IAASB, 2019, ISA 700, ISA 705, and ISA 706).

2.2 Materiality in Auditing

According to ISA 320.4, during the audit planning stage, when the overall audit strategy is being defined, the auditor must determine materiality for the financial statements as a whole, taking into account all knowledge obtained about the entity and its environment (IAASB, 2019). This knowledge enables the auditor to establish a materiality threshold that helps focus attention on the most relevant and critical areas of the financial statements, thereby providing the entity's stakeholders with reliable and relevant information for their economic decision-making (IAASB, 2021).

In accordance with ISA 320, materiality represents a quantitative (amounts) or qualitative (nature) threshold used by the auditor to assess the significance of omissions or misstatements in the financial statements (IAASB, 2019). Information is considered material if its omission or misstatement, individually or in the aggregate, could influence the decisions of stakeholders who rely on the financial statements as a basis for economic decisions. The literature has emphasised that materiality is one of the most critical concepts in auditing, as it shapes the perception of financial information quality and directly influences the economic decisions of users (Christensen et al., 2020; Choudhary et al., 2019; Kend & Nguyen, 2023).

The materiality established during the audit planning stage does not necessarily imply that any amount below that threshold automatically renders misstatements, individually or collectively, irrelevant. Some misstatements may still be considered significant by the auditor even if they do not exceed the established materiality threshold. It is not feasible to design audit procedures that identify all misstatements which could be significant solely on the basis of their nature. However, analysing the nature of potential misstatements in disclosures is essential when designing audit procedures to address the risk of material misstatement. Furthermore, when assessing the impact of all uncorrected misstatements on the financial statements, the auditor must consider not only their amount, but also their nature and the specific circumstances in which they occurred (IAASB, 2019, ISA 320.6).

The International Standards on Auditing identify two distinct levels of materiality applied by auditors (Lakis et al., 2017). The first threshold is defined as Planning Materiality, referring to the magnitude of misstatements that, if omitted or misstated, could influence the economic decisions of reasonable users taken on the basis of the financial statements. This is the auditor's principal reference point when assessing the risk of material misstatement and determining the scope of audit procedures (IAASB, 2019, ISA 320.10).

To reduce the likelihood that the aggregate of uncorrected and undetected misstatements exceeds the Planning Materiality, a second materiality threshold, known as Performance Materiality, is established (IAASB, 2019, ISA 320.10). This threshold, generally set between 50% and 75% of the Planning Materiality value (Proença, 2021), is determined by the auditor to guide both the planning and execution of audit procedures. Typically, this value is lower than the materiality defined for the financial statements as a whole, thereby reducing the risk that accumulated misstatements, individually or collectively, exceed overall materiality (IAASB, 2019, ISA 320.9). Performance Materiality thus serves as a practical tool for auditors, providing a basis for the execution of audit procedures (Lakis et al., 2017).

Beyond these two formally defined levels, professional practice has also consolidated a third parameter, commonly referred to as the clearly trivial threshold. This represents the value above which the auditor considers it necessary to accumulate identified misstatements, even if they are not individually material. This threshold serves as a practical criterion for distinguishing between clearly inconsequential misstatements, which need not be communicated or adjusted, and those that, although immaterial individually, should be recorded and assessed collectively with others.

Recent studies confirm that professional practice in the United Kingdom and other jurisdictions largely follows this three-tiered model, albeit with variations across audit firms and sectors (Dwyer et al., 2023; Quick et al., 2023; Zhu et al., 2024).

2.2.1 Determination of Materiality Value

Determining an appropriate materiality level is a complex task that requires the exercise of the auditor's professional judgment, as this value depends on the different needs and expectations of users of the financial statements (Dong et al., 2024). Furthermore, the auditor must recognise that materiality is not fixed; it should be adjusted

if relevant information is obtained during the course of the audit (IAASB, 2019, ISA 320.12).

Although the precise definition of the materiality value is fundamental, the International Standards on Auditing do not specify explicit minimum thresholds to be considered when assessing misstatements that affect the financial statements (Dong et al., 2024). Despite the lack of prescriptive guidance in the ISAs, it is common practice to calculate materiality based on a percentage applied to a relevant financial indicator. This indicator may vary depending on the characteristics of the audited entity, with benchmarks such as Profit Before Tax (PBT), Total Assets, Equity, or Revenue frequently used as bases for the calculation (Dong et al., 2024).

In addition, the percentage applied also varies according to factors such as the industry sector, the size of the entity, and the auditor’s professional judgment, allowing materiality to be tailored to the specific context of the financial statements under analysis (FRC, 2017).

Empirical evidence, however, shows considerable heterogeneity in the choice of benchmarks and percentages, reflecting not only economic and institutional factors but also competitive pressures among audit firms (Quick et al., 2023; Brissman & Watson, 2023). Nevertheless, most audit firms, as well as several authors, propose guidelines for calculating materiality. These guidelines are grounded in reference indicators and specific percentage ranges, presented as follows:

Figure 1: Indicators for the Calculation of Materiality

Reference Indicator	Percentage
Profit Before Tax (PBT)	5% to 10%
Operating Profit	3% to 6%
Sales and Services Revenue	0,5% to 2%
Total Assets	1% to 3%
Total Equity	3% to 5%

Source: Own elaboration based on Proença (2021)

Thus, the determination of materiality should not be understood as a purely technical exercise, but rather as a judgment interdependent on the perception of risk and the economic context in which the audit takes place. This interrelation justifies the joint analysis of these concepts in the following chapters (Blokdiijk et al., 2003; Choudhary et al., 2019).

2.3 Audit Risk

Audit risk is defined by ISA 200 as the risk that the auditor expresses an inappropriate opinion on the financial statements when those statements are materially misstated. This concept is central to the auditor's work, reflecting their responsibility to plan and perform the audit in such a way as to reduce audit risk to an acceptably low level, thereby enabling the issuance of a well-founded and reasonable opinion. Academic research has demonstrated that the assessment and management of audit risk are key determinants of audit quality, directly influencing the likelihood of detecting errors and fraud (Baldauf et al., 2015; Choudhary et al., 2019; Grassa et al., 2022).

To manage this risk, both professional practice and academic literature have developed the so-called Audit Risk Model, which constitutes the dominant conceptual framework for its assessment and response. According to the International Standards on Auditing, audit risk results from the interaction among three main components: Inherent Risk and Control Risk, which together form the Risk of Material Misstatement, and Detection Risk. Although this model is widely accepted and applied, several studies highlight its limitations, namely the difficulty of empirically measuring its components and the tendency to underestimate systemic or pervasive risks (Blokdijs et al., 2003; Emby & Pecchiari, 2013).

The Risk of Material Misstatement, as discussed in the revised ISA 315 (IAASB, 2019), refers to the possibility that the financial statements contain material misstatements before any audit procedures are performed. This risk exists independently of the auditor and is assessed at two main levels: the overall financial statement level and the level of individual assertions. Inherent Risk, as defined in ISA 315 (IAASB, 2019), represents the susceptibility of an assertion to misstatement due to error or fraud, before considering any related controls. This risk is particularly high in areas involving complex transactions, calculations, or estimates that require significant professional judgment. Additionally, substantial changes in the organisational structure or regulatory environment of an entity may also increase inherent risk.

Control Risk, on the other hand, refers to the possibility that an entity's internal controls fail to prevent, detect, or correct material misstatements in the financial statements effectively and in a timely manner. ISA 315 emphasises that the effectiveness

of controls depends not only on their design, that is, how they were structured to mitigate risks, but also on how they are implemented and operated over time (IAASB, 2019).

Finally, Detection Risk is defined in ISA 200 as the risk that the audit procedures performed by the auditor fail to detect a material misstatement that exists in the financial statements (IAASB, 2019). This risk is directly influenced by the nature, timing, and extent of audit procedures, as well as by the auditor's professional judgment. Factors such as the inherent limitations of auditing, including the use of sampling techniques, the reliance on audit evidence, and the effectiveness of planned procedures, significantly affect detection risk.

2.3.1 Risk Assessment

Risk assessment in auditing constitutes an essential step to ensure that the auditor plans the engagement effectively and efficiently, identifying and focusing on areas that present a higher susceptibility to material misstatement. This process, governed by the revised ISA 315, involves a thorough analysis of the entity, its environment, and its internal control system, enabling the auditor to understand the factors that may adversely affect the financial statements (IAASB, 2019).

The first stage of risk assessment is obtaining a comprehensive understanding of the entity and the environment in which it operates. This understanding includes analysing the nature of the business, its operational activities, the industry in which it operates, and the applicable regulations. Such knowledge is crucial for identifying both external and internal factors that may influence the reliability of the financial statements. For example, entities operating in regulated markets are often exposed to specific risks that require special attention from the auditor.

Next, the auditor evaluates the entity's internal control system by analysing the design and implementation of controls. This step allows the auditor to determine the extent to which existing controls are effective in preventing or detecting material misstatements. ISA 315 emphasises the importance of understanding not only the control environment, that is, management's attitudes and policies toward the implementation of controls, but also specific control activities, such as procedures related to transaction approvals or account reconciliations (IAASB, 2019).

The identification of specific risks is based on this detailed understanding. The auditor must identify areas of heightened vulnerability, such as accounting estimates subject to significant judgment, unusual or significant transactions, and potential fraud risks. Once identified, these risks are evaluated in terms of their likelihood and impact, allowing the auditor to determine which risks are significant and require a more robust response. It is at this stage that the auditor determines materiality, establishing the thresholds for identifying what may be considered relevant in the context of the financial statements, thereby focusing efforts on the most critical areas with the greatest potential impact. Several empirical studies demonstrate that the determination of materiality is intrinsically linked to risk assessment, with both judgments being complementary in defining the overall audit strategy (Blokdijs et al., 2003; Choudhary et al., 2019).

For each identified risk, the auditor must plan appropriate responses, aligning the nature, timing, and extent of audit procedures with the specific characteristics of the risk. For example, significant risks may require more detailed tests of controls, while other risks may be addressed through standard substantive procedures. This approach ensures that the auditor's resources are directed proportionally to the severity of the risks identified.

Finally, the risk assessment process must be thoroughly documented. ISA 315 requires the auditor to record the identified risks, the rationale for their assessments, and the planned responses (IAASB, 2019). This documentation ensures traceability of the process, providing a solid basis for justifying the professional judgments and decisions made throughout the audit.

Therefore, risk assessment is not merely a preliminary stage of the audit but a continuous process that influences all subsequent decisions. By ensuring that critical areas are appropriately assessed and that procedures are tailored to the entity's circumstances, the auditor increases the likelihood of detecting material misstatements, thereby enhancing the reliability of the audit work and strengthening stakeholders' confidence in the audited financial statements.

2.4 Risk Assessment and Materiality

The literature has sought to understand how materiality judgments relate to the perception and assessment of audit risk. Early empirical studies revealed an inverse relationship between financial risk indicators and the materiality threshold defined by

auditors. Blokdijs et al. (2003) demonstrated that proxies such as leverage and the presence of negative earnings are negatively associated with materiality, suggesting that firms with higher financial risk tend to adopt more conservative materiality levels.

Subsequent research, based on larger datasets, has further explored this relationship. Choudhary et al. (2019) analysed PCAOB inspection reports and concluded that higher materiality levels are positively associated with residual audit risk, reflecting the trade-off between audit efficiency and the risk of non-detection. Quick et al. (2023) reinforced this evidence by documenting that auditors tend to adopt higher materiality thresholds in contexts of greater competitive pressure, which may imply the acceptance of higher residual risk.

The empirical measurement of risk in audit research has employed different approaches. Some authors use composite risk indices, constructed from financial and governance variables (Choudhary et al., 2019; Baldauf et al., 2015). Others rely on binary variables, such as a negative earnings dummy, or market-based proxies, such as stock return volatility (Widyadhana & Feliana, 2023; Hsu & Yang, 2022). These measures enable the operationalisation of the relationship between risk and materiality in a comparable manner across different contexts and samples.

More recent evidence has introduced relevant nuances. In the context of the FTSE 350, studies identify an inverse relationship between risk and materiality, confirming that higher perceived risk is associated with more conservative materiality thresholds. However, Brissman and Watson (2023), when analysing the COVID-19 pandemic period, concluded that despite the increase in perceived risk, materiality levels underwent few adjustments, suggesting a possible disconnect between risk and quantitative materiality judgment in times of crisis. Similar results are reported by Haddad et al. (2023) and Hsu and Yang (2022), who identify significant increases in inherent and control risk without corresponding systematic changes in materiality thresholds.

International studies also reveal relevant differences. Zhu et al. (2024), in the case of China, document that higher materiality levels are associated with lower audit quality, particularly in firms with a greater propensity for earnings management. Kend and Nguyen (2023) further show that materiality disclosure practices vary across countries depending on institutional pressures and stakeholder expectations, which in turn shape how risk and materiality are reported.

In summary, the literature on the relationship between risk and materiality presents heterogeneous and sometimes contradictory results. While some studies document a conservative response by auditors to increased risk, others suggest a disconnect between perceived risk and materiality, especially in crisis contexts. These tensions become particularly relevant in the case of the COVID-19 pandemic, which represented an exogenous shock of heightened uncertainty and raises new questions about how auditors adjusted their materiality judgments during that period.

2.5 The Impact of COVID-19 on Auditing

COVID-19 is a disease caused by the SARS-CoV-2 coronavirus, which emerged at the end of 2019 and rapidly spread across the globe. On 11 March 2020, the World Health Organization (WHO) declared it a pandemic (European Centre for Disease Prevention and Control, 2023). This pandemic triggered an unprecedented global economic crisis, affecting virtually all countries and sectors. In 2020, economic activity contracted in 90% of countries, resulting in an approximately 3% decline in global GDP and the first rise in global poverty in a generation (World Bank, 2022).

2.5.1 Impact of COVID-19 on Risk Assessment and Materiality Determination

As discussed in the previous chapter, the literature on the relationship between risk and materiality presents heterogeneous and, at times, contradictory findings. Within this context, the COVID-19 pandemic represented a genuine “natural test” of how auditors respond to an exogenous shock of uncertainty.

The COVID-19 pandemic had a profound impact on the determination of materiality within the context of auditing and financial reporting, requiring significant adaptation of traditional practices to address the uncertainties and challenges imposed by the crisis. Materiality, which represents the threshold of significance at which a misstatement may influence users’ decisions regarding the financial statements, had to be reassessed to reflect the drastic changes in operations, financial projections, and risk structures. According to OROC (2020), materiality during the pandemic needed to be adjusted to account for substantial changes in business operations and financial health, particularly for companies that experienced abrupt declines in revenue or increased operational costs due to supply chain disruptions and shifts in consumption patterns.

One of the most significant effects was the need to adjust the benchmarks traditionally used to determine materiality. As profits were severely affected, many auditors began to prioritise more stable metrics, such as total assets or equity, over income-based measures, which were highly volatile in 2020 (Dong et al., 2024; Newton et al., 2023). In some cases, reductions in the percentages applied to these benchmarks were also observed, reflecting auditors' attempts to align materiality levels with the heightened risk environment of the period.

The same OROC (2020) report emphasised that, in audits conducted during the pandemic, it was essential to reassess the traditional criteria for materiality, given the increased risks of material misstatement. The economic uncertainty created the need for more detailed analyses of the sector-specific impacts and the solvency of entities. Furthermore, the study by Olivier Blanchard (2023) on the effects of the pandemic on inflation in the United States reinforces that unexpected economic shocks, such as increases in commodity prices and shifts in sectoral demand, generated significant economic pressures. Although the article does not directly address materiality, it demonstrates how large-scale economic changes affect assets, inventories, and financial projections, elements that are crucial to auditors' evaluations.

Another area of debate concerns the lack of consensus regarding the actual impact of the pandemic on materiality thresholds. While some studies indicate that auditors did not substantially reduce materiality values, preferring instead to mitigate risk through additional testing and strengthened procedures (Brissman & Watson, 2023; Hsu & Yang, 2022; Dwyer et al., 2023), other studies suggest that adjustments in applied percentages did occur, albeit unevenly across jurisdictions and sectors (Newton et al., 2023). This lack of uniformity suggests that the pandemic exposed pre-existing tensions identified in the literature, the clarification of which remains an important research gap.

Going-concern assessment was another element profoundly affected by the pandemic, playing a crucial role in determining materiality. According to ISA 570, auditors are responsible for assessing an entity's ability to continue as a going concern for at least 12 months after the financial statement date (IAASB, 2019). During the pandemic, entire sectors such as aviation and hospitality faced significant uncertainty regarding their ability to continue operating, forcing auditors to closely examine the feasibility of financial restructuring plans, the impact of government support measures

such as subsidies and tax deferrals, and companies' ability to access emergency financing (OROC, 2020).

Not all sectors were equally affected by the pandemic. The World Bank (2022) report notes that industries such as tourism, air transport, and physical retail were severely impacted, whereas sectors such as technology and e-commerce prospered. This required a sector-specific approach to materiality, with auditors needing to adjust their practices to reflect the specific characteristics of each industry. Furthermore, OROC highlighted that in the most affected sectors, such as services and hospitality, auditors had to consider the possibility of prolonged recoveries and assess the impact of renewed restrictions or lockdowns on corporate financial operations. The study by Elisabeth Figueiredo (2021) on remote work during the pandemic reinforces how organisational changes imposed by this context altered business processes. The widespread shift to remote work led to adaptations in companies' internal structures, which in turn affected internal control systems and, consequently, auditors' materiality assessments. Although the study does not focus directly on auditing, it highlights how organisational changes had to be incorporated into auditors' analyses.

Another critical aspect was the need to revise accounting estimates and future projections. According to Lassoued (2021), in his study on earnings management in Europe, many companies engaged in aggressive profit manipulation practices to mask the negative financial effects of the pandemic. This created a new urgency for auditors to rigorously evaluate accounting estimates. ISA 540 requires auditors to consider the reasonableness of such estimates (IAASB, 2019), which proved especially challenging under extreme uncertainty such as that caused by COVID-19. Key areas of assessment included the revaluation of intangible assets such as goodwill, the recognition of provisions for expected credit losses due to increased default risk, and the valuation of inventories in sectors facing sharp declines in demand (Lassoued et al., 2021).

Communication between auditors and management bodies also became more critical than ever during the pandemic. The OROC report emphasised that auditors needed to communicate material issues directly to management, clearly explaining how materiality criteria were adjusted to address the specific challenges of the period. The International Standards Manual reinforces the need for these communications to include clear information about the effects of subsequent events related to COVID-19, such as changes in government policies or shifts in the economic environment. Proença (2021)

also underscores the importance of the role of statutory auditors (Revisores Oficiais de Contas) in promoting transparency and rigour in the application of structural funds and public resource oversight, particularly during a critical period like the pandemic, when the credibility of financial reporting became even more vital.

The global impact of the pandemic was also significant. The World Bank (2022) report on equitable recovery highlights that disparities in economic recovery between high- and low-income countries directly affected companies, forcing auditors to consider macroeconomic conditions when determining materiality. Low-income countries faced substantial challenges, such as limited access to emergency funding, while corporate solvency was severely affected by the withdrawal of fiscal and monetary stimulus measures.

The pandemic underscored the need for auditors to adopt more flexible and dynamic approaches in determining materiality. According to OROC, this included the adoption of continuous assessments instead of one-off evaluations, due to the volatility of the economic environment. Moreover, the use of advanced technologies allowed auditors to monitor risks and obtain real-time data, enabling faster adjustments to audit processes. Finally, the pandemic reinforced the importance of aligning audit practices with the principles of the International Standards on Auditing (ISA), ensuring that professional judgments remained consistent with the challenges imposed by the crisis (World Bank, 2022).

2.6 Identified Research Gaps

Despite significant advances in the auditing literature regarding the definition of materiality and the assessment of risk, several gaps persist that limit a comprehensive understanding of these topics, particularly in the context of the COVID-19 pandemic.

First, there has been limited attention to the interactions between risk and pandemic crisis situations. Most studies address risk and materiality in stable or economically “normal” contexts (Blokdijs et al., 2003; Choudhary et al., 2019), but few have systematically examined how exogenous shocks of uncertainty, such as COVID-19, alter auditors’ risk perceptions, applied benchmarks, and materiality thresholds (Dong et al., 2024; Newton et al., 2023). The existing empirical evidence presents mixed results: while some authors suggest that auditors adjusted benchmarks and reduced applied percentages (Newton et al., 2023), others conclude that materiality levels remained stable, with risk

being mitigated through additional procedures (Brissman & Watson, 2023; Hsu & Yang, 2022). This lack of consensus underscores the need for further studies that explicitly link risk and materiality in crisis contexts.

Second, the literature has predominantly relied on isolated proxies for risk, such as the loss variable, leverage indicators, or stock return volatility (Blokdijs et al., 2003; Quick et al., 2023). While useful, these unidimensional measures are insufficient to capture the complexity of the risks faced by entities and auditors in uncertain environments. There is thus a clear need to develop composite risk metrics that simultaneously integrate financial, governance, market, and operational dimensions, enabling more robust and comparable analyses (Baldauf et al., 2015; Newton et al., 2023).

Another gap concerns sectoral and geographical heterogeneity. Studies such as Brissman and Watson (2023) and Hsu and Yang (2022) show that the effects of the pandemic varied substantially across industries, yet few works explore in depth how such differences are reflected in the determination of materiality and risk assessment. Similarly, recent research (Zhu et al., 2024; Kend & Nguyen, 2023) highlights international disparities in the disclosure and application of materiality, revealing that institutional and regulatory frameworks significantly shape auditors' professional judgments.

A further methodological gap can also be observed. Many studies rely on descriptive analyses of audit reports or survey responses from professionals (Grassa et al., 2022; Dwyer et al., 2023), but there is a scarcity of research combining these approaches with market data, firm performance measures, and longitudinal analysis. The predominance of studies based on self-reported perceptions also raises concerns about external validity, making it difficult to assess to what extent the findings reflect actual practices. In this regard, publicly disclosed and mandatory data, such as that available in the United Kingdom, offer a unique opportunity for more robust empirical analysis.

In summary, the existing literature does not yet provide an integrated framework that adequately explains the relationship between risk and materiality in high-uncertainty environments. Persistent gaps remain regarding the treatment of interactions between risk and crisis contexts, the development of multidimensional risk metrics, the analysis of sectoral and jurisdictional heterogeneity, and the use of mixed-method research designs. The present study seeks to address some of these limitations by empirically examining

the relationship between risk and materiality in the United Kingdom, where the mandatory disclosure of materiality thresholds enables a more precise exploration of auditors' adjustments under pandemic crisis conditions.

CHAPTER III – THEORETICAL FRAMEWORK AND HYPOTHESIS DEVELOPMENT

3 Theoretical Framework and Hypotheses Development

3.1 Complementary Theoretical Frameworks

Understanding the relationship between risk and materiality in auditing can be enriched by drawing on complementary theoretical frameworks that help explain the incentives, constraints, and practices observed in the field. Among the most relevant are agency theory, information asymmetry theory, and institutional theory.

Agency theory (Jensen & Meckling, 1976, reprinted 2019) posits that the separation between ownership and management generates conflicts of interest between shareholders (principals) and managers (agents). In this context, auditing emerges as a monitoring mechanism designed to reduce the likelihood that managers will manipulate financial information for their own benefit. Materiality, as the criterion that defines the expected level of detail and rigour in reviewing financial statements, plays a central role in this relationship: more conservative materiality thresholds increase the probability of detecting irregularities, thereby strengthening investor and creditor protection. Recent studies show that variables associated with agency risk, such as leverage level or board composition, directly influence auditors' materiality decisions (Amiram et al., 2017; Choudhary et al., 2019).

Information asymmetry theory complements this perspective by emphasising that managers naturally possess more information about a company's economic condition than external stakeholders. Auditing reduces this asymmetry, enhancing the credibility of financial statements. The definition of materiality directly affects the degree of transparency: higher materiality thresholds reduce the amount of disclosed information and may compromise the perceived quality of reporting, whereas lower materialities promote greater detail and, consequently, higher market confidence (Christensen et al., 2020; Kend & Nguyen, 2023). The literature, however, indicates that in periods of high uncertainty, such as during the COVID-19 pandemic, this information-reducing function was partially compromised, as many auditors maintained relatively stable materiality thresholds despite increased risk levels (Brissman & Watson, 2023; Newton et al., 2023).

Finally, institutional theory provides an additional framework for understanding international variations in materiality practices. This theory emphasises that auditors operate not only according to technical criteria but also in response to regulatory, social,

and market pressures. Studies such as Dwyer et al. (2023), Zhu et al. (2024), and Kend and Nguyen (2023) document that differences in regulatory regimes and stakeholder expectations lead to distinct approaches to the disclosure and determination of materiality. The case of the United Kingdom, for instance, is characterised by a pioneering requirement for public disclosure of materiality thresholds, making it a particularly relevant context for empirically examining the interaction between risk, materiality, and exogenous shocks such as the pandemic.

In summary, these theoretical perspectives provide a solid foundation for understanding auditors' decisions regarding materiality. Agency theory explains the incentives underlying monitoring behaviour; information asymmetry theory highlights the impact of materiality on reporting transparency; and institutional theory illustrates how contextual factors shape audit practices. Together, these frameworks support the formulation of this study's hypotheses and reinforce the importance of empirically analysing how risk and materiality interact in high-uncertainty environments.

3.2 Hypotheses Formulation

Early academic studies analysed the factors influencing auditors' materiality judgments, recognising their relevance to audit decision-making (Estes & Reames, 1988; DeZoort et al., 2006). However, the lack of access to actual materiality data led these initial investigations to rely on estimated or inferred values. Acito et al. (2009) highlighted that understanding how materiality is effectively applied within audit firms would be of substantial value to both academic research and users of financial statements.

Following the amendments to ISA 700, which since 2013 has required the disclosure of materiality in the audit reports of listed companies in the United Kingdom (IAASB, 2019), recent studies have gained access to real data (Choudhary et al., 2019; Goh et al., 2023; Gutierrez et al., 2018; Hallman et al., 2018; Livne et al., 2024; Quick et al., 2023; Wellmeyer et al., 2024). These studies confirm the importance of materiality assessment for the audit process and audit quality, showing that it depends on professional judgment and is linked to various firm-specific characteristics. In theory, auditors are expected to consider audit risks arising from economic events (Doogar et al., 2015). However, although evidence shows that materiality levels vary substantially across clients and even within audit firms, little is still known about how periods of severe economic recession affect auditors' determination of materiality.

The COVID-19 pandemic helped to shed light on this issue. Despite the efforts of governments and regulatory bodies, the pandemic led to the deepest global recession in decades (World Bank, 2022), creating an environment of profound economic uncertainty. COVID-19 had a severe impact on healthcare systems, population mobility, and economic growth (Baker et al., 2020). To contain the crisis, most countries implemented lockdown measures, causing disruptions in supply chains, production processes, and consumer demand. The abrupt changes brought by the pandemic may have significantly increased audit risk due to (1) its impact on financial reporting processes and internal controls, (2) the sudden need to adapt audit practices, and (3) the intensification of economic uncertainty (Dong et al., 2024).

Recent research indicates that the pandemic negatively affected firms' financial reporting quality (Hsu & Yang, 2022) as well as their internal and external transparency (Ho et al., 2023). In the auditing context, several studies point to significant effects of the pandemic. Harjoto and Laksmana (2022), for instance, found that auditors increased their fees and faced longer audit delays during the pandemic. Furthermore, Kend and Nguyen (2022) note that around 3% of the audit procedures implemented during COVID-19 were developed specifically to mitigate risks arising from the pandemic. Tighe (2022), through interviews, highlights the impact of remote work on the professional development and personal life of junior auditors. These findings reinforce the notion that auditing became more complex and riskier during this period. Similarly, Gong et al. (2022) demonstrate that audits conducted under COVID-19-related restrictions exhibited lower quality.

Although the studies mentioned have explored the pandemic's impact on financial reporting and auditing, it remains unclear (1) whether, and to what extent, auditors adjusted their materiality assessments in practice, an aspect that directly influences overall audit and reporting quality, and (2) whether the relationship between materiality assessment and audit outcomes was affected during the pandemic period (Dong et al., 2024). Consequently, Dong et al. (2024) investigated these questions and concluded that during the COVID-19 pandemic, auditors primarily adjusted the choice of benchmarks used to determine materiality, without substantially reducing the materiality values themselves. There was a decline in the use of profit-before-tax benchmarks and an increase in the use of asset-based and revenue-based benchmarks.

Moreover, the results show an asymmetric pattern in materiality decisions: when firms experienced performance declines, auditors were more likely to change the type of

benchmark but not to reduce materiality levels; conversely, when firms performed well, materiality thresholds were increased without changing the benchmark. This suggests that auditors may have used benchmark substitution as a way to avoid lowering materiality, and consequently to minimise the increase in audit effort. Additionally, the study found that audits performed during the pandemic had higher fees and longer reporting delays, and that materiality was negatively associated with both audit fees and reporting lag. However, the relationship between materiality and audit outcomes did not change significantly between the pre- and post-pandemic periods.

Brissman et al. (2023), in their study examining whether the COVID-19 pandemic affected auditors' risk and materiality assessments in Sweden, and, if so, how, concluded that although auditors adopted a more conservative approach to risk assessment in response to the exogenous risk shock caused by the pandemic, they did not significantly adjust their materiality evaluations.

Based on the preceding discussion, we formulate the following hypotheses:

H1: The level of risk (financial, performance, and liquidity) is negatively associated with the materiality threshold defined by auditors.

H2: The COVID-19 pandemic significantly altered the relationship between risk and materiality.

CHAPTER IV – METHODOLOGY

4 Methodology

4.1 Sample and Period

The sample of this study consists of companies that were part of the FTSE 100 index during the period between 2015 and 2024. The choice of this universe is justified by two main reasons. First, the FTSE 100 represents the largest listed companies in the United Kingdom and is one of Europe's benchmark indices in terms of liquidity, market capitalization, and relevance to institutional investors and regulators. Second, since the introduction of ISA 700 in 2013, the disclosure of materiality thresholds in audit reports has become mandatory, thereby providing objective and comparable data for academic research (Choudhary et al., 2019; Quick et al., 2023; IAASB, 2019).

The analysis period from 2015 to 2024 was selected to encompass three distinct phases: (i) the pre-pandemic period (2015–2019), characterized by relative economic and regulatory stability; (ii) the pandemic period (2020–2021), marked by the uncertainty shock associated with COVID-19; and (iii) the post-pandemic period (2022–2024), which allows for the assessment of potential structural changes in the relationship between risk and materiality in an economic recovery context.

The sample includes all companies that were part of the index in at least one of the years within the analysis period, ensuring broad and longitudinal coverage. Companies without available audit reports or with incomplete information regarding materiality are excluded from the final sample.

4.2 Data Collection and Processing Procedures

The data collection for this study was conducted in two main stages. In the first stage, information regarding materiality was manually collected directly from the annual audit reports of companies included in the FTSE 100 index during the period 2015–2024. The choice of the FTSE 100, rather than the FTSE 350, was driven by the need to balance representativeness and data collection feasibility. Although the FTSE 350 provides broader coverage of the UK market, the number of firms would make manual data collection excessively extensive and potentially inconsistent. The FTSE 100, on the other hand, includes the largest and most representative companies listed in London, ensuring sectoral diversity and high disclosure quality, while allowing for an in-depth and methodologically feasible empirical analysis.

These audit reports allowed the identification not only of the materiality values applied by auditors but also of the identity of the audit firm and any auditor changes over the analysis period.

In the second stage, all remaining financial, market, and governance variables were extracted from the Refinitiv Datastream database (Refinitiv Datastream, 2025), ensuring consistency and international comparability. This procedure provided measures of financial, performance, and growth risk, such as leverage (LEV), Return on Assets (ROA), Market-to-Book Value (MTBV), and sales growth. Regarding governance variables, Refinitiv supplied indicators including board independence, CEO duality, board size, and board skill diversity.

After collection, all data were organised into a panel dataset, temporally aligning each company's information for the 2015–2024 period. To ensure comparability, all monetary variables were converted into pounds sterling (GBP). Additionally, certain variables were adjusted into ratio form (for example, Audit Fees / Total Assets) to mitigate distortions arising from firm size differences. Missing data were addressed through manual verification in company annual reports or, when recovery was not possible, by excluding the corresponding observation to avoid compromising the statistical integrity of the sample.

This process resulted in a robust dataset combining information from public sources (annual audit reports) and consolidated financial databases (Refinitiv Datastream), ensuring the reliability, comparability, and replicability of the study.

4.3 Construction of Variables

4.3.1 Dependent Variable

The dependent variable of this study corresponds to the natural logarithm of the materiality value disclosed in audit reports, normalized by total assets ($\ln(OM/TA)$). This measure was chosen to ensure comparability across firms of different sizes, since absolute materiality values can vary substantially according to the scale of the audited entity (Choudhary et al., 2019; Quick et al., 2023). The use of the logarithmic transformation is justified by the need to reduce skewness, stabilize variance, and facilitate the interpretation of estimated coefficients in proportional or elasticity terms.

The normalization of materiality by total assets follows an established practice in both academic research and regulation. Previous studies show that auditors often rely on total assets as an alternative benchmark in contexts of high earnings volatility or in capital-intensive industries (Dong et al., 2024; Newton et al., 2023). This approach helps to mitigate distortions arising from temporary performance fluctuations, providing a more stable and representative measure of the asset base on which audit judgments are made (Dwyer et al., 2023).

Additionally, the choice of $\ln(OM/TA)$ is consistent with the professional practice of audit firms in the United Kingdom, where, since the revision of ISA 700, auditors are required to disclose the applied materiality values, which are frequently expressed as a percentage of total assets or profit before tax (Choudhary et al., 2019; Quick et al., 2023). Recent empirical evidence confirms that total assets are commonly used as a benchmark in large firms or in situations of negative earnings, precisely to ensure consistency and relevance in defining the materiality threshold (Dong et al., 2024; Zhu et al., 2024).

Thus, the variable $\ln(OM/TA)$ constitutes a robust metric that captures, in a comparable manner, auditors' professional judgment decisions, aligning both with normative practices and with prior empirical research on the determinants of materiality.

4.3.2 Independent Variable

The main independent variable of the study, presented in Equation (1), corresponds to the *Risk_Index*, constructed through the normalization (z-score) and aggregation of multiple risk proxies commonly used in the auditing literature: financial leverage (LEV), occurrence of losses (LOSS), return on assets (ROA), current ratio (CURR_RATIO), operational efficiency measured by sales turnover (Sales Turn), and Market-to-Book Value ratio (MTBV).

Equation 1

$$Risk_Index = \frac{Z_{LEV} - Z_{Curr_Ratio} - Z_{ROA} - Z_{Sales_Turn} - Z_{MTBV} + Z_{Loss}}{6}$$

The construction of composite risk indices has been advocated in the literature as a way to overcome the limitations of isolated proxies, which tend to capture only partial dimensions of risk exposure (Baldauf et al., 2015; Choudhary et al., 2019). Classic studies, such as Blokdiijk et al. (2003), demonstrated that individual variables, namely leverage and negative earnings, are negatively associated with materiality. However,

subsequent analyses (Choudhary et al., 2019; Quick et al., 2023) have shown that the relationship between risk and materiality is more complex and influenced by multiple financial and operational factors, thereby justifying the use of aggregated measures.

In this study, the risk index was constructed as the average of the winsorized z-scores of LEV (+), LOSS (+), Current Ratio (–), ROA (–), Sales Turnover (–), and Market-to-Book (–). The use of an aggregated metric follows the literature that recommends combining multiple risk and information quality proxies into a single standardized measure (Amiram et al., 2017), allowing the simultaneous capture of liquidity, performance, leverage, and market valuation dimensions.

Each component of the index captures a specific dimension of risk:

- LEV (financial leverage) reflects creditor pressure and greater susceptibility to default, frequently associated with more conservative materiality thresholds (Blokdijs et al., 2003; Amiram et al., 2017).
- LOSS (negative earnings dummy) indicates weakness in economic performance and is consistently treated in the literature as a signal of heightened risk (Blokdijs et al., 2003; Quick et al., 2023).
- ROA (return on assets) captures firm performance and profitability, which is inversely related to risk. (Hsu & Yang, 2022; Brissman & Watson, 2023).
- CURR_RATIO (current ratio) measures the firm's ability to meet short-term obligations and serves as an inverse indicator of liquidity risk; lower ratios reflect greater financial vulnerability (Choudhary et al., 2019).
- Sales Turnover (operational efficiency): low asset turnover indicates reduced operational efficiency, associated with higher risk (Dong et al., 2024).
- MTBV (Market-to-Book ratio): lower ratios signal unfavourable market expectations and potential undervaluation risk, often interpreted as higher financial uncertainty (Amiram et al., 2017).

The aggregation of these variables through z-score standardization eliminates scale differences among proxies and synthesizes multiple risk dimensions into a single, comparable metric. This approach addresses one of the gaps identified in the literature, namely, the need for composite metrics that jointly capture financial, performance, and liquidity dimensions (Newton et al., 2023).

Accordingly, the Risk_Index represents a robust, multidimensional measure of corporate risk, suitable for analysing its relationship with auditors' materiality judgments in both normal and crisis contexts, such as the COVID-19 pandemic.

Complementarily, the study considers a second independent variable, presented in Equation (2), designated ZRisk_COVID1, which results from the interaction between the composite risk index (Risk_Index) and the pandemic dummy (COVID).

Equation 2

$$Z_{Risk_COVID1} = Z_{Risk1} \times COVID$$

This specification allows capturing the differential effects of risk during systemic shock periods, such as COVID-19, by isolating the conjunctural impacts of the pandemic context from the structural determinants of risk.

4.3.3 Control Variables

In addition to the dependent variable $\ln(OM/TA)$ and the main independent variable (Risk_Index), the model includes a set of control variables supported by the auditing, corporate governance, and financial reporting literature. The purpose of including these controls is to isolate the effect of risk on the determination of materiality, ensuring that other known determinants do not bias the results.

4.3.3.1 Factors Associated with Firm Size and Complexity

The size and complexity of the audited entity are widely recognized as key determinants in the definition of materiality, reflecting the potential impact that errors or omissions may have on the financial statements (Amiram et al., 2017; Choudhary et al., 2019). Accordingly, the model includes a set of proxies that capture different aspects of firm scale, industry characteristics, and operational structure.

First, industry sector (Oil & Gas, Basic Materials, Industrials, Consumer, Health, Telecommunications, Utilities, Financials, Services, and Technology) is included as a control variable, since different industries exhibit distinct risk structures, margins, and benchmarks that may influence materiality determination (Blokdijs et al., 2003; Quick et al., 2023). This control helps to better isolate the effects of risk and the pandemic period, thereby enhancing the validity of the inferences (Hsu & Yang, 2022; Goh et al., 2023; Dong et al., 2024).

Firm size is captured through several measures, particularly LN_Asset (natural logarithm of total assets) (Hsu & Yang, 2022; Wellmeyer et al., 2024; Goh et al., 2023; Dong et al., 2024). The literature documents that larger firms tend to exhibit higher absolute materiality levels but lower relative materiality, since even small misstatements may have a significant impact (Choudhary et al., 2019). Therefore, the expected sign for these variables is generally negative.

Beyond size, performance and efficiency metrics are also considered. The Return on Assets (ROA) reflects the relative profitability of the firm's assets. Previous studies suggest that higher profitability levels are associated with higher materiality thresholds, given the lower perceived risk by auditors (Choudhary et al., 2019; Hsu & Yang, 2022; Wellmeyer et al., 2024; Goh et al., 2023; Dong et al., 2024).

Additionally, financial leverage (LEV), measured as the ratio of total debt to total assets, is included. The literature indicates that higher leverage increases auditors' perception of risk, typically leading to the definition of more conservative materiality levels (Blokdijs et al., 2003; Choudhary et al., 2019; Quick et al., 2023; Dong et al., 2024).

4.3.3.2 Factors Associated with the Impact of Corporate Governance on the Determination of Materiality

Corporate governance plays a central role in the determination of materiality, as it influences both the quality of financial reporting and the level of scrutiny required by auditors. Stronger governance structures tend to promote greater transparency and rigor, potentially leading auditors to adopt more conservative materiality thresholds (Keune et al., 2012; Amiram et al., 2017). To capture this effect, the model includes a set of variables that reflect the composition, independence, and characteristics of the board of directors.

The first variable, IND_BS, measures the percentage of independent members on the board of directors. More independent boards tend to strengthen management oversight and reduce the likelihood of opportunistic practices such as earnings management (Hsu & Yang, 2022; Goh et al., 2023; Dong et al., 2024). However, the literature does not present a clear consensus regarding the expected sign: some studies report lower materiality thresholds in the presence of greater board independence (Amiram et al., 2017), while others suggest that independence may not translate into significant changes in auditors' professional judgment (Keune et al., 2012).

4.3.3.3 Factors Associated with the Relationship with the Auditor

The relationship between the firm and the auditor is another relevant determinant in the definition of materiality, as it reflects both the expected audit quality and the level of scrutiny applied to the financial reporting process. The literature suggests that characteristics related to the structure and intensity of the audit engagement can directly influence materiality (Amiram et al., 2017).

The variable BIG4 assesses whether the audit was conducted by one of the four largest international audit firms (Deloitte, Ernst & Young, KPMG, or PwC). The literature indicates that these firms, due to their strong reputation and greater exposure to reputational risk, tend to adopt stricter auditing practices and more conservative materiality thresholds (Francis, 2004; Choi et al., 2010; Hsu & Yang, 2022; Wellmeyer et al., 2024). Therefore, firms audited by BIG4 are expected to exhibit lower levels of materiality.

Table 1 presents the description of all variables included in the model, along with their definitions and expected theoretical signs.

Table 1: Description of the Model Variables

Variable	Definition	Expected Sign	Source
MATERIALITY_£	Monetary value of materiality disclosed (in £ million)	—	Audit Report
MAT_%Assets	$\text{MATERIALITY_£} / \text{Total Assets} (\times 100)$	—	Audit Report + Balance Sheet
Risk_Index	Composite index = mean of winsorized z-scores: +LEV, +LOSS, -Curr_Ratio, -ROA, -Sales_Turn, -MTBV	+ $\rightarrow$ MATERIALITY_£	Own elaboration
COVID	Dummy variable: 1 for fiscal years 2020 and 2021, 0 otherwise	—	—
Size	$\ln(\text{Total Assets})$	(B) + $\rightarrow$ MATERIALITY_£; (C-a) + $\rightarrow$ lnFees; (C-b) -/0 $\rightarrow$ Delay	Balance Sheet
LEV	Leverage = Total Debt / Total Assets	(C) + $\rightarrow$ lnFees, Delay, GC	Balance Sheet
ROA	Net Income / Total Assets	(B) - $\rightarrow$ MAT_%Assets; (C) - $\rightarrow$ lnFees, Delay, GC	Income Statement + Balance Sheet
Curr_Ratio	Current Assets / Current Liabilities	(C) - $\rightarrow$ lnFees, Delay, GC	Balance Sheet
Sales_Turn	Sales / Total Assets (turnover ratio)	(B) - $\rightarrow$ MAT_%Assets; (C) - $\rightarrow$ lnFees/Delay	Income Statement + Balance Sheet
MTBV	Market-to-Book Value	(C) - $\rightarrow$ lnFees/Delay/GC	Market Data + Balance Sheet
LOSS	Indicator (=1) if Net Income < 0	(C) + $\rightarrow$ lnFees, Delay, GC	Income Statement

BIG4	Indicator (=1) if auditor is a Big Four firm	(C-a) + $\rightarrow$ lnFees; (C-b) $\rightarrow$ 0 $\rightarrow$ Delay	Audit Report
IND_BS	Percentage of independent members on the Board of Directors	—	Corporate Governance Report
FIRM_FE	Auditor fixed effects (dummy variables)	—	—
IND_FE	Industry fixed effects (2-digit classification)	—	—
YEAR_FE	Year fixed effects	—	—

4.4 Econometric Model

Based on the hypotheses formulated in the previous section, the econometric model to be estimated aims to assess the relationship between risk and materiality, as well as the impact of the COVID-19 pandemic on this relationship. The dependent variable corresponds to the normalized materiality (OM/TA), while the main independent variable is the Risk_Index, constructed from the standardized z-scores of the risk proxies (LEV, LOSS, ROA, CURR_RATIO).

To test H1 – higher risk is associated with lower levels of materiality – the following model is estimated (Equation 3):

Equation 3

$$\ln(OM/TA)_{i,t} = \alpha + \beta_1 Risk_Index_{i,t} + \sum_k \gamma_k Control_{i,t}^k + \varepsilon_{i,t}$$

Where:

- $OM_TA_{i,t}$ corresponds to the ratio between the overall materiality (OM) and total assets of firm i in year t ;
- $Risk_Index_{i,t}$ is the composite risk index described in the previous section;
- $Control_{i,t}^k$ represents the vector of control variables (firm size, auditor, governance characteristics, etc.);
- $\varepsilon_{i,t}$ is the idiosyncratic error term.

To test H2 – The COVID-19 pandemic significantly altered the relationship between risk and materiality –, the model introduces an interaction term between the risk index and a COVID dummy (equal to 1 for fiscal years 2020–2021, and 0 otherwise). This specification allows us to assess whether the sensitivity of materiality to risk differed

during the pandemic period, capturing the conjunctural adjustments induced by heightened uncertainty. Accordingly, the following model is estimated (Equation 4):

Equation 4

$$\ln(OM/TA)_{i,t} = \alpha + \beta_1 Risk_Index_{i,t} + \beta_2 COVID_t + \beta_3 (Risk_Index_{i,t} \times COVID_t) + \sum_k \gamma_k Control_{i,t}^k + \varepsilon_{i,t}$$

Where:

- $COVID_t$ is a dummy variable equal to 1 for fiscal years 2020–2021 and 0 otherwise;
- $Risk_Index_{i,t} \times COVID_t$ represents the interaction term that captures how the effect of risk on materiality changed during the pandemic;
- All other variables are defined as in Equation (3).

To ensure the robustness of the estimates, the models were specified with firm, year, and industry fixed effects, in order to control for unobservable firm-specific factors, macroeconomic shocks, and sectoral characteristics. Standard errors were clustered at the firm level, allowing for correction of potential autocorrelation and heteroskedasticity within each entity over time.

Additionally, to mitigate the influence of extreme values, a winsorization procedure was applied at the 1st and 99th percentiles, replacing outliers without compromising the variability of the sample.

Monetary variables were converted into millions of pounds sterling (£), while ratios were expressed as a percentage of total assets, ensuring comparability across firms of different sizes.

4.5 Methodological Limitations and Robustness Tests

Despite the care taken in constructing the database and defining the empirical model, this research faces some methodological limitations that should be acknowledged.

First, the dependent variable $\ln(OM/TA)$ is based on materiality values disclosed in audit reports. Although the disclosure requirement established by ISA 700 ensures consistency, the manner in which auditors present and justify these values may vary across firms and over time. This heterogeneity may introduce unobservable noise,

limiting the absolute comparability between companies (Choudhary et al., 2019; Quick et al., 2023).

Second, the construction of the Risk_Index results from the aggregation of financial proxies (LEV, LOSS, ROA, CURR_RATIO), which, although providing a composite measure, does not entirely eliminate the arbitrariness in the selection and weighting of these variables. Previous studies (Baldauf et al., 2015; Choudhary et al., 2019) emphasize that different combinations of proxies may lead to distinct interpretations of risk.

A third limitation arises from the use of data from FTSE 100 firms, which represent large publicly listed companies in the United Kingdom. While such a sample ensures high data quality and comparability, it restricts the generalization of results to smaller firms or other institutional settings. Furthermore, specific regulatory and institutional features of the UK may influence the relationship between risk and materiality, reducing the international applicability of the findings (Kend & Nguyen, 2023; Zhu et al., 2024).

Regarding the econometric model, the analysis assumes linear relationships and does not consider potential non-linearities or endogeneity issues. For instance, the relationship between risk and materiality may be bidirectional: while risk affects materiality, the choice of more conservative materiality thresholds may also influence stakeholders' perception of risk. Although the inclusion of control variables mitigates this concern, it cannot be fully eliminated.

To address these limitations, several robustness tests are performed. First, the estimation is repeated using alternative measures of risk, including individual proxies (LEV, LOSS, ROA, CURR_RATIO) in isolation, to verify whether the results remain consistent. Second, alternative specifications for the dependent variable are tested, namely normalizing materiality by pre-tax income or revenues, which are benchmarks commonly used by auditors (Dong et al., 2024; Newton et al., 2023). Third, sensitivity analyses are conducted excluding outliers, ensuring that results are not driven by extreme observations. Finally, both fixed-effects and random-effects panel models are compared, with selection based on the Hausman test, to ensure the adequacy of the panel specification.

CHAPTER V – EMPIRICAL RESULTS

5 Empirical Results

5.1 Descriptive Statistics

The descriptive statistics of the variables included in the model are summarized in Table 2.

Table 2: Descriptive Statistics of the Model Variables

Variable	Obs	Mean	Std. dev.	Min	Max
ln(OM/TA)	1,208	-5.721025	1.102671	-10.13912	-1,862598
Risk_Index	1,094	-.0869237	.5600951	-2.979521	1.44373
ZRisk_COVID1	1,094	.0031034	.2756765	-2.979521	1.44373
LEV	1,322	.6311173	.2393801	.0104571	2.807803
LEV_COVID	1,322	.1328917	.2809188	0	1.366938
LnA	1,322	23.11608	1.802075	17.58022	28.52221
ROA	1,321	.0601868	.1850616	-.4408801	2.518245
BIG4	1,372	.8819242	.3228155	0	1
IND_BS	1,291	66.74816	14.06408	.5555556	100

Note: Table 2 presents the descriptive statistics of the variables used in the model. The dependent variable $\ln(\text{OM}/\text{TA})$ corresponds to the natural logarithm of the disclosed materiality, normalized by total assets. The main independent variables are Risk_Index, which represents the composite risk index constructed from the winsorized z-scores of leverage (LEV), negative results (LOSS), return on assets (ROA), current ratio (CURR_RATIO), sales turnover, and market-to-book value (MTBV); and ZRisk_COVID1, which results from the interaction between the risk index and the dummy for the pandemic period (2020–2021). Control variables include: LEV (financial leverage), LEV_COVID (interaction between leverage and the COVID period), LnA (natural logarithm of total assets, proxy for firm size), ROA (return on assets), BIG4 (dummy equal to 1 when the audit is performed by a Big Four firm), and IND_BS (percentage of independent directors on the board).

The dependent variable, $\ln(\text{OM}/\text{TA})$, has a mean of approximately -5.721025, with a standard deviation of 1.102671 and values ranging between -10,13912 and -1,862598. These results suggest that, although most observations are concentrated around the mean, there are significant differences in the materiality thresholds defined by auditors across firms.

Regarding the main independent variable, the risk index (Risk_Index) shows an average close to 0, as expected given that it is a standardized measure, and a relatively low standard deviation (0.0869), indicating moderate dispersion among firms. The version adjusted for the COVID period (ZRisk_COVID1) also presents an average close to 0, but with lower variability, suggesting that the effects of the pandemic resulted in more homogeneous changes in firms' risk profiles.

The control variables highlight the heterogeneity of the sample. Leverage (LEV) shows a mean of 0.63, with values ranging from 0.01 to 2.80, revealing the presence of both lowly leveraged and highly leveraged firms. Return on assets (ROA) has a slightly positive mean (0.06) but with negative minimum values, indicating that some firms reported losses. Firm size, measured by the natural logarithm of total assets (LnA), has a mean of 23.1, ranging between 17.58 and 28.52, reflecting a sample that includes both smaller entities and large multinational corporations.

As for the audit and governance variables, approximately 88% of the firms are audited by a Big Four firm (BIG4 = 0.88), confirming the high market concentration in this segment. Additionally, the proportion of independent directors on boards (IND_BS) averages 66.7%, but with strong dispersion, ranging from 56% to 100%, revealing notable differences in governance practices.

The differences in the number of observations across variables (e.g., 1,208 for $\ln(OM/TA)$ vs. 1,094 for Risk_Index) result from missing data in specific firm-year observations, mainly due to incomplete financial or governance information in Refinitiv Datastream and, in a few cases, unavailable audit reports. These discrepancies are common in longitudinal datasets and do not materially affect the validity of the results, as missing values are randomly distributed and do not exhibit systematic patterns.

In summary, the descriptive results indicate a sample characterized by diversity in both risk profiles and governance and audit dimensions, which reinforces the relevance of the subsequent econometric analysis.

5.2 Correlations and Multicollinearity Diagnostics

This section presents the correlation matrix among the variables included in the econometric model (Table 3), as well as the multicollinearity diagnostic tests. The objective is to assess the direction and intensity of the bivariate associations between the dependent variable, the main independent variable, and the control variables, while also verifying the existence of potential redundancy problems among the regressors. This preliminary analysis is essential to ensure the robustness of the subsequent regressions and to determine whether the observed patterns are consistent with theoretical expectations and prior empirical evidence in the literature.

Table 3: Pearson Correlation Matrix of the Model Variables

	lnOM_A	Z_Risk1	ZRisk_COVID1	LEV	LEV_COVID	Ln(Assets)	ROA	Audit Big 4 (=1)	IND_BS
lnOM_A	1.000								
Risk_Index	-0.597***	1.000							
ZRisk_COVID1	-0.235***	0.489***	1.000						
LEV	-0.260***	0.364***	0.208***	1.000					
LEV_COVID	-0.143***	0.164***	0.170***	0.174***	1.000				
Ln(Assets)	-0.603***	0.519***	0.202***	0.198***	0.083***	1.000			
ROA	0.535***	-0.656***	-0.246***	-0.031	-0.079**	-0.372***	1.000		
Audit Big 4 (=1)	-0.067**	0.003	-0.028	0.064**	-0.001	0.120***	0.034	1.000	
IND_BS	-0.083***	0.114***	0.022	-0.069**	0.022	0.332***	-0.037	0.012	1.000

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: Table 3 presents the Pearson correlation matrix among the variables included in the model. The dependent variable, $\ln(\text{OM}/\text{TA})$, corresponds to the natural logarithm of the materiality disclosed in the audit report, normalized by total assets. The main independent variables are Risk_Index, a composite risk index constructed from the winsorized z-scores of leverage, negative earnings, return on assets, current ratio, sales turnover, and market-to-book ratio, and ZRisk_COVID1, which results from the interaction between the risk index and the COVID-19 dummy (2020–2021). Control variables include LEV (financial leverage), LEV_COVID (interaction between leverage and the COVID period), Ln(Assets) (natural logarithm of total assets), ROA (return on assets), Audit Big4 (=1) (dummy variable equal to 1 when the audit is performed by a Big Four firm), and IND_BS (percentage of independent directors on the board). Year and industry fixed effects are included; robust standard errors are clustered at the firm level.

The correlation analysis reveals that relative materiality ($\ln(\text{OM}/\text{TA})$) exhibits a strong negative association with the composite risk index (Risk_Index; $\rho = -0.597$). This result suggests that riskier firms tend to adopt more conservative materiality thresholds.

Similarly, a negative correlation is observed between $\ln(\text{OM}/\text{TA})$ and firm size (LnAssets; $\rho = -0.603$), indicating that larger firms tend to display relatively lower levels of materiality.

Conversely, profitability (ROA) shows a positive correlation with $\ln(\text{OM}/\text{TA})$ ($\rho = 0.535$), suggesting that more profitable firms establish higher materiality levels. This evidence may reflect the greater financial stability of such firms, allowing auditors to tolerate larger deviations without compromising reporting quality.

Although of smaller magnitude, financial leverage (LEV) exhibits a negative association with $\ln(\text{OM}/\text{TA})$ ($\rho = -0.260$), implying that more leveraged firms face higher default risk, leading auditors to adopt more conservative materiality judgments. Furthermore, COVID-related variables, such as ZRisk_COVID1 and LEV_COVID, also show negative correlations with $\ln(\text{OM}/\text{TA})$ ($\rho = -0.235$ and -0.143 , respectively), albeit less pronounced.

Additionally, $\ln(\text{OM}/\text{TA})$ is negatively and significantly correlated with the presence of Big Four auditors ($\rho = -0.067$) and with board independence (IND_BS; $\rho = -0.083$). Although small in magnitude, these associations suggest that both auditor

reputation and board composition may exert some (albeit limited) influence on materiality decisions.

The composite risk index (Risk_Index) shows a moderate positive correlation with firm size (LnAssets; $\rho = 0.519$), indicating that larger firms tend to exhibit higher perceived risk, possibly due to greater operational complexity. In contrast, a strong negative correlation is found between Risk_Index and profitability (ROA; $\rho = -0.656$), suggesting that less profitable firms are perceived as riskier. Financial leverage (LEV) is positively correlated with the composite risk index ($\rho = 0.364$), indicating that higher debt levels are associated with greater overall risk exposure. During the pandemic period, the COVID-related risk adjustment (ZRisk_COVID1) is positively associated with the base risk index ($\rho = 0.489$), confirming that COVID-19 uncertainty amplified auditors' perceived risk.

Beyond the central relationships, additional patterns emerge. A moderate positive correlation is observed between firm size (LnAssets) and the presence of Big Four auditors ($\rho = 0.120$), suggesting that larger firms are more likely to engage higher-reputation auditors. Similarly, board independence (IND_BS) is positively correlated with LnAssets ($\rho = 0.332$), indicating that larger firms tend to have more independent governance structures. The pandemic-specific variable LEV_COVID shows a positive but low correlation with general leverage (LEV; $\rho = 0.174^{***}$), suggesting that both capture distinct dimensions of indebtedness and can thus be included simultaneously in the model without strong multicollinearity concerns.

Regarding multicollinearity diagnostics, no issues compromising the validity of the regressions were identified. None of the correlations exceed the critical $|0.70|$ threshold, with the strongest being the negative association between composite risk (Risk_Index) and profitability (ROA; $\rho = -0.656$). Although relatively strong, this relationship remains below problematic levels and, at most, may slightly increase standard errors.

Complementarily, the Variance Inflation Factor (VIF) tests confirm the absence of relevant multicollinearity. Mean VIF values range between 2.56 and 2.64, well below the conventional threshold of 5 suggested by the literature (Hair et al., 2019). This result ensures that there is no significant statistical redundancy among explanatory variables, allowing their joint inclusion in the model without distortion of the estimates.

In summary, both the correlation matrix and VIF diagnostics confirm that the variables capture distinct and meaningful dimensions of the phenomenon under analysis, thereby supporting the robustness of the subsequent econometric results.

5.3 Main Regression Results

This section presents the results of the main regression analyses, estimated using firm and year fixed effects, in order to assess the impact of risk, firm characteristics, and governance attributes on audit materiality.

Table 4 reports the estimations examining the relationship between relative materiality ($\ln(\text{OM}/\text{TA})$) and the composite risk index (Risk_Index).

Table 4: Regressions of Relative Materiality ($\ln(\text{OM}/\text{TA})$) on the Composite Risk Index (Risk_Index)

	Firm and year fixed effects; SE clustered by firm $\ln(\text{OM}/\text{TA})$	Firm and year fixed effects; SE clustered by firm + COVID $\ln(\text{OM}/\text{TA})$
Risk_Index	-0.167*** (0.048)	-0.178*** (0.056)
$\ln A$	-0.374*** (0.044)	-0.372*** (0.045)
ROA	0.539*** (0.132)	0.515*** (0.150)
BIG4	-0.022 (0.199)	-0.023 (0.198)
IND_BS	-0.004*** (0.001)	-0.004*** (0.001)
ZRisk_COVID1		0.024 (0.036)
_cons	7.944*** (0.954)	7.895*** (0.964)
N	1018	1018
R-squared	0.9072	0.9073
Adj R-squared	0.8946	0.8945
Within R-sq.	0.3380	0.3383

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: Table 4 presents the regression results with firm and year fixed effects, examining the relationship between the composite risk index (Risk_Index) and relative materiality (ln(OM/TA)). Column (1) reports the baseline model results, while column (2) includes the interaction with the pandemic dummy (ZRisk_COVID1) to capture potential differential effects during 2020–2021. Control variables include firm size (LnA), profitability (ROA), auditor type (BIG4), and board independence (IND_BS). Year and industry fixed effects are included; robust standard errors are clustered at the firm level.

The results show a negative and highly significant coefficient, indicating that a one-unit increase in risk corresponds to a reduction of approximately 16,7% to 17,8% in materiality ($p < 0.01$). This finding confirms auditors' sensitivity to risk and evidences the adoption of more conservative practices in contexts of greater uncertainty.

Consistently, firm size (LnAssets) exhibits negative and statistically significant coefficients, with elasticities ranging between -0.372 and -0.374 , reinforcing the idea that auditors tend to define lower materiality thresholds for larger entities. In contrast, profitability (ROA) shows positive and economically meaningful coefficients, corresponding to increases of +51,5% to +53,9% in materiality. These results suggest that more profitable firms, by conveying greater financial stability, allow auditors to accept higher thresholds without compromising the quality of financial reporting.

Regarding governance variables, board independence (IND_BS) is associated with more conservative materiality thresholds, although with a smaller magnitude, while the BIG4 variable does not display a statistically robust impact.

Table 5 reports the estimations focusing on financial leverage (LEV) and its interaction with the pandemic period.

Table 5: Regressions of Relative Materiality (ln(OM/TA)) on Leverage (LEV) and Interaction with COVID

	Firm and year fixed effects; SE clustered by firm Ln (OM/TA)	Firm and year fixed effects; SE clustered by firm + COVID Ln (OM/TA)
LEV	-0.193 (0.140)	-0.166 (0.141)
LnA	-0.464*** (0.057)	-0.466*** (0.057)
ROA	0.819*** (0.214)	0.817*** (0.204)
BIG4	0.097 (0.252)	0.094 (0.253)
IND_BS	-0.004*** (0.001)	-0.004*** (0.001)
LEV_COVID		-0.217** (0.090)
_cons	9.880*** (1.270)	9.961*** (1.256)
N	1.207	1.207
R-squared	0.9430	0.9433
Adj R-squared	0.9354	0.9357
Within R-sq.	0.3566	0.3604

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: Table 5 presents the regression results with firm and year fixed effects, examining the relationship between financial leverage (LEV) and relative materiality (ln(OM/TA)), including the interaction with the pandemic dummy variable (LEV_COVID). Column (1) reports the baseline model results, while column (2) adds the interaction term to capture potential differential effects during 2020–2021. Control variables include firm size (LnA), profitability (ROA), auditor type (BIG4), and board independence (IND_BS). Robust standard errors are clustered at the firm level.

When considered in isolation, the COVID dummy variable does not systematically affect materiality. However, the LEV×COVID interaction exhibits a negative and statistically significant coefficient ($p < 0.05$ / $p < 0.01$), suggesting that during 2020–2021 auditors tightened materiality thresholds primarily for more highly leveraged clients.

Overall, the results remain consistent across different model specifications and reinforce the evidence that higher levels of risk and larger firm size are associated with

more conservative materiality levels, whereas profitability mitigates this effect. Furthermore, the findings confirm that the pandemic amplified heterogeneity in materiality determination, particularly as a function of leverage, validating auditors' perception of heightened risk during this period.

5.4 Robustness Analyses

The Hausman test indicates that the coefficients differ systematically between the random effects (RE) and fixed effects (FE) models ($\chi^2(14) = 56.76$; $p < 0.001$ and $\chi^2(14) = 41.95$; $p < 0.001$), suggesting correlation between the regressors and the unobserved effects. Consequently, firm and year fixed effects specifications were adopted, with standard errors clustered at the firm level to ensure greater robustness in parameter estimation.

Additionally, the coefficients of determination (R^2) range between 0.88 and 0.93 across the estimated models. These results demonstrate that the specifications exhibit a high explanatory power regarding the observed variability in relative materiality, reinforcing the adequacy of the empirical strategy adopted.

Overall, the robustness tests confirm that the results are consistent and statistically reliable, ensuring that the conclusions regarding the relationship between risk, leverage, and materiality are not artifacts of model specification issues or multicollinearity.

CHAPTER VI - DISCUSSION

6 Discussion

6.1 Interpretation in Light of the Literature

The results largely confirm the theoretical expectations outlined in the literature review, showing patterns consistent with how auditors calibrate materiality judgments.

First, the negative and statistically significant association between the composite risk index (Risk_Index) and relative materiality ($\ln(\text{OM}/\text{TA})$) indicates that firms with higher risk are assessed more conservatively by auditors (see Table 4, column (2), line Risk_Index: $\beta = -0.178$, $p < 0.01$). This finding aligns with the classical evidence of Blokdijk et al. (2003) and is reinforced by Quick et al. (2022), who document the sensitivity of materiality thresholds to client risk levels. Auditors appear to internalize perceptions of greater uncertainty and adjust materiality downward to reduce the likelihood that material misstatements remain undetected.

Regarding firm size, measured by the logarithm of total assets (LnA), the negative coefficients confirm that larger entities tend to exhibit lower materiality levels (Table 4, column (2), line LnA: $\beta = -0.372$, $p < 0.01$). This result is consistent with Choudhary et al. (2019) and Amiram et al. (2017), who emphasize that in large companies even small misstatements may be relevant due to reputational implications and heightened regulatory and public scrutiny.

Conversely, profitability (ROA) displays positive and economically meaningful coefficients, suggesting that more profitable firms are associated with higher materiality thresholds (Table 4, column (2), line ROA: $\beta = 0.515$, $p < 0.01$). This finding is in line with Carcello and Li (2013), who argue that financially stable firms inspire greater auditor confidence, allowing for the acceptance of larger deviations without compromising reporting quality.

The analysis of COVID-19–related variables reveals differentiated effects. While the variable ZRisk_COVID1 does not exhibit a robust effect in the main models (Table 4, column (2), line ZRisk_COVID1: $\beta = 0.024$), the interaction between leverage (LEV) and the pandemic period (LEV×COVID) shows a negative and statistically significant coefficient (Table 5, column (2), line LEV_COVID: $\beta = -0.217$, $p < 0.05$). This indicates that auditors adopted more conservative materiality thresholds particularly for highly leveraged firms during the COVID-19 period (2020–2021), reflecting heightened

perceptions of financial vulnerability. It is important to note that this effect is not uniform across all firms but is especially pronounced among those with higher leverage. In other words, the conservatism observed during the pandemic was conditional on financial risk, highlighting a differentiated auditor response to firms more exposed to default and liquidity constraints. These conclusions are consistent with the recent findings of Dong et al. (2024) and Brissman et al. (2023), who document specific adjustments to materiality in response to increased uncertainty during the pandemic. Moreover, the evidence is consistent with recent findings indicating that UK auditors often responded to increased uncertainty by adjusting the benchmark used to determine materiality, rather than the materiality level itself, so as to preserve comparability and perceived audit quality (Dong et al., 2024; Brissman et al., 2023; Newton et al., 2023).

As for audit- and governance-related variables, the results are weaker. The variable associated with Big4 auditors does not display statistically robust effects (Table 4, column (2), line BIG4: $\beta = -0.023$), diverging from studies such as Francis (2004) and Gul et al. (2013), which suggest that higher-reputation audit firms apply more conservative materiality levels. However, the high prevalence of Big4 auditors in the sample ($\approx 88\%$) substantially limits cross-sectional variation; therefore, the lack of statistical significance may reflect limited statistical power rather than the true absence of differences in auditor behaviour. In contrast, board independence (IND_BS) shows a negative association, albeit of smaller magnitude (Table 4, column (2), line IND_BS: $\beta = -0.004$, $p < 0.01$), consistent with the corporate governance literature (Keune et al., 2012) that posits more independent boards exert stronger pressure on financial reporting quality.

In summary, the empirical evidence confirms that risk, firm size, and profitability are key determinants of materiality, in line with prior literature. However, the effects of audit-related (BIG4) and governance-related (IND_BS) variables appear less consistent, suggesting that their impact may depend on specific contexts or on factors not captured by the model.

6.2 Comparison with Professional Standards (ISA 320)

ISA 320 establishes that the determination of materiality must take into account both quantitative and qualitative factors to ensure that financial statements are free from material misstatements that could influence users' decisions. Materiality should be

defined based on the entity's characteristics, the associated risk, and the specific circumstances of each reporting period.

The results of this study show strong alignment with these normative guidelines. The negative association between risk (Risk_Index) and materiality ($\ln(OM/TA)$) confirms that auditors adjust materiality thresholds in response to higher levels of uncertainty, as recommended by ISA 320. The standard explicitly states that, in contexts of heightened risk, materiality should be set more conservatively to reduce the likelihood that material misstatements go undetected.

Similarly, the evidence that larger firms display relatively lower levels of materiality is consistent with ISA 320's guidance. Although the standard does not prescribe fixed benchmarks, it highlights that, for entities with significant public exposure and economic relevance, even smaller misstatements may be considered material to users of financial information.

The positive influence of profitability (ROA) on materiality can also be interpreted in light of ISA 320, as financially sound firms provide a more stable foundation for audit judgments. The standard recognizes that materiality should reflect not only firm size but also the entity's ability to continue operating without significant financial constraints.

In the context of the COVID-19 pandemic, the interaction between leverage (LEV) and the pandemic period indicates that auditors applied more conservative materiality assessments to clients with greater exposure to default risk. This practice is in accordance with ISA 320's emphasis on the need to adjust materiality for exceptional circumstances that may threaten business continuity or increase the risk of material misstatement.

Conversely, the non-significant effect of the Big4 variable suggests that, despite literature highlighting the higher stringency of these firms, professional practice may be more aligned with the uniform application of ISA 320 guidelines, regardless of the auditor's reputation. This finding implies that materiality determinations largely follow standardized professional norms across the audit industry, thereby enhancing consistency and comparability in practice.

Overall, the empirical evidence confirms that auditors' application of materiality is consistent with the fundamental principles of ISA 320, demonstrating that risk, firm size,

profitability, and exceptional circumstances, such as the pandemic, are key determinants in the materiality assessment process.

6.3 Implications for Regulators and Auditors

The results of this study have important implications for both regulators and audit professionals.

First, the confirmation that risk and financial leverage are associated with more conservative materiality levels reinforces the importance of explicitly incorporating these factors into regulatory guidance and quality inspections. For regulators such as the CMVM or the IAASB, this evidence provides empirical support for strengthening the monitoring of consistency in materiality application across auditors and entities, ensuring that similar audit judgments do not result in materially different tolerance levels without sound justification.

Furthermore, the heterogeneity observed during the COVID-19 period demonstrates that, under conditions of heightened uncertainty, auditors tend to prudently adjust materiality thresholds, particularly for more highly leveraged clients. While this behavior is positive from the standpoint of investor and stakeholder protection, it poses challenges for maintaining uniformity across the profession. For regulators, this finding suggests the need to issue additional guidance during crisis periods to ensure proportionate and comparable responses across audit firms.

For auditors, the results confirm that classical determinants, such as firm size, risk, and profitability, remain central to the definition of materiality, consistent with professional best practices and the principles set forth in ISA 320. However, the absence of a robust effect for the Big4 variable suggests that the distinction between large international audit firms and other auditors may be less pronounced than often assumed. This finding can reinforce users' confidence in the overall homogeneity of professional practices, but it also underscores the responsibility of auditors to clearly document the criteria used to determine materiality, regardless of their affiliation with a Big4 firm.

Finally, the evidence that materiality tends to be lower in larger and riskier firms points to a potential regulatory trade-off: while such conservative practices enhance investor and creditor protection, they may also increase the costs and operational demands of the audit process. Regulators and professionals should therefore seek a balance

between the rigor of practice and the operational feasibility of audit procedures, ensuring that the primary focus remains on the detection and prevention of material misstatements.

In summary, the findings of this study offer insights that can support both regulatory oversight and professional practice, promoting a more transparent, consistent, and well-grounded application of materiality criteria, particularly in contexts of elevated risk or economic crisis.

CHAPTER VII – CONCLUSIONS

7 Conclusions

7.1 Main Conclusions

The present study aimed to analyse the determinants of relative materiality as disclosed in audit reports, with a particular focus on the role of risk, financial leverage, firm size, and corporate governance.

The results show that the dependent variable, the natural logarithm of materiality normalised by total assets, is significantly influenced by both risk-related factors and the structural characteristics of firms. The composite risk index exhibited negative and statistically robust coefficients, indicating that riskier firms tend to adopt more conservative materiality thresholds. Consistently, firm size, measured by the natural logarithm of total assets, also displayed negative coefficients, reinforcing the notion that larger entities are subject to greater public and regulatory scrutiny, which leads to lower materiality levels.

Conversely, profitability, measured by return on assets (ROA), was found to be positively associated with materiality, suggesting that more profitable firms convey greater financial stability, thereby allowing auditors to tolerate deviations of higher magnitude without compromising the quality of the reported information.

Within the domain of corporate governance, board independence was negatively associated with materiality, albeit with a smaller effect size, indicating that firms with more independent boards tend to apply more conservative materiality thresholds. In contrast, the variable capturing whether the audit was conducted by a Big4 firm did not exhibit a statistically significant or robust effect, suggesting that the auditor's reputation alone does not determine the materiality levels disclosed.

Finally, the findings related to the COVID-19 period reveal that the interaction between financial leverage and the pandemic heightened auditors' conservatism, particularly among more highly leveraged firms. The empirical evidence therefore indicates that, in times of heightened uncertainty, auditors adopt a more cautious approach when defining materiality, adjusting thresholds according to the financial profile of the audited entities.

In summary, the study concludes that materiality determinations are not arbitrary but instead reflect a combination of factors related to risk, firm size, profitability, and

governance. This confirms that the definition of materiality is a judgmental process conditioned by both economic and contextual determinants, in line with professional standards and prior academic literature.

7.2 Research Limitations

Although the results of this study provide valuable contributions to the literature on audit materiality, several limitations should be acknowledged when interpreting the findings.

First, the sample is restricted to firms listed on the FTSE 100 in the United Kingdom, which limits the generalisability of the results to other institutional and regulatory contexts. The definition and application of materiality may vary according to national auditing standards, legal frameworks, and country-specific professional practices. Consequently, the findings should be interpreted with caution. It should also be noted that the choice of the FTSE 100, rather than the broader FTSE 350, was driven by methodological feasibility. Collecting materiality data manually for over 300 firms would have increased the risk of inconsistency and reduced data reliability. The focus on the FTSE 100 thus ensured sectoral representativeness and data quality, as it includes the largest publicly traded firms in the UK. Nonetheless, a potential selection bias remains due to the exclusion of smaller firms from the FTSE 350, which may display different behaviours regarding materiality determination and risk sensitivity.

Second, the dependent variable $\ln(\text{OM}/\text{TA})$, although widely adopted in prior research, represents an approximation of the concept of materiality and may not fully capture the qualitative dimensions considered by auditors in their professional judgment processes.

A third limitation concerns the set of explanatory variables employed. While the model incorporates key determinants such as risk, leverage, profitability, size, and governance, other potentially relevant factors, such as operational complexity, geographic dispersion, or ownership structure, were not included due to data availability constraints.

Additionally, the analysis of the pandemic period through COVID-19, adjusted variables represents only an approximation of the extraordinary uncertainty experienced at that time. It is plausible that other unobserved contextual factors also influenced auditors' materiality judgments during the pandemic.

Finally, although robust statistical procedures were employed, including firm and year fixed effects and multicollinearity diagnostics, the possibility of endogeneity cannot be entirely ruled out, which may affect the causal interpretation of the estimated relationships.

7.3 Suggestions for Future Research

Building on the limitations identified, several avenues remain open for further exploration of the determinants of audit materiality.

First, it would be valuable to extend the analysis to smaller and more open markets, such as Portugal, in order to assess whether the results hold in contexts characterised by smaller listed firms, lower ownership dispersion, and potentially less concentrated audit markets. Furthermore, extending the observation period would make it possible to examine the persistence of the effects identified and to understand how the impact of the pandemic evolved across different phases of the economic cycle.

Second, future studies could incorporate additional variables that were not included in this analysis, such as operational complexity, internationalisation, capital structure, or auditor-specific characteristics (e.g., industry specialisation or prior engagement experience). These dimensions may significantly influence the professional judgment process underlying materiality determination.

Another promising line of research would be to compare results across jurisdictions, thereby exploring the role of national auditing standards and regulatory enforcement in shaping materiality thresholds. Such comparative approaches could help determine whether the determinants identified in this study are universal or context-dependent, varying according to institutional settings.

Finally, it would be pertinent to examine the long-term effects of the COVID-19 pandemic on auditing practices, distinguishing between temporary adjustments and structural changes in auditors' professional judgment. This could provide valuable insights into the resilience and adaptability of the auditing profession in the face of systemic shocks.

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