The Audit Pricing Implications of the CSRD: Evidence from Listed European Firms

Qiyu Chen & An Wang

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Supervisor: Diem Nguyen
Examiner: Anders Anell

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Abstract

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Authors: Qiyu Chen & An Wang
Advisor/Examiner: Diem Nguyen/Anders Anell
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Purpose: This study provides some of the earliest causal empirical evidence on the real economic consequences of the CSRD by investigating whether this mandatory disclosure regulation leads to a significant increase in audit fees for listed firms. Going beyond baseline analysis, we examine whether the compliance cost pressure cascades down to listed small and medium-sized enterprises (SMEs), and evaluate whether a firm's industry environmental sensitivity or pre-existing organizational ESG performance acts as a strategic buffer to moderate the regulatory pricing shock.

Theoretical perspectives: The theoretical literature employed in this paper are the Simunic's Audit Pricing Framework, Audit Risk Theory, Agency Theory, Stakeholder Theory, Signaling theory and Isomorphism.

Methodology: We employ a series of difference-in-differences (DID), multiple-treatment DID, and difference-in-difference-in-differences (DDD) specifications. To validate causal identification and ensure robustness, Propensity Score Matching (PSM-DID), parallel trends examinations, and placebo tests are employed.

Empirical foundation: This study uses firms in the Europe Union from 2017 to 2025, with a final sample of 1,877 firms and 10,772 firm-year observations. In the subsample analysis of H4, the sample dropped to 4,837 firm-year observations.

Conclusions: The baseline DID model supports H1, demonstrating that mandated large firms experienced an approximate 6.6% increase in audit fees following the directive's implementation. H2 and H3 are not supported, suggesting that CSRD-related audit fee effects are mainly concentrated among directly mandated large firms in the early implementation period. The absence of significant SME spillover and industry-sensitivity effects may reflect delayed transmission of CSRD pressures and relatively standardised audit pricing at the initial stage. Finally, H4 receives partial support. While aggregate ESG scores do not significantly moderate the pricing shock, individual pillar analysis reveals that pre-existing Environmental and Social pillars significantly attenuate the upward audit fee pressure, confirming that historical sustainability infrastructure serves as a buffer against regulatory shocks.

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Abbreviations

ARM	Audit Risk Model
Big 4	Deloitte, EY, KPMG, and PwC
CR	Current Ratio
CSRD	Corporate Sustainability Reporting Directive
CSR	Corporate Social Responsibility
DDD	Difference-in-Difference-in-Differences
DID	Difference-in-Differences
E	Environmental pillar
ESG	Environmental, Social, and Governance
ESRS	European Sustainability Reporting Standards
FE	Fixed Effects
FY	Financial Year
G	Governance pillar
GICS	Global Industry Classification Standard
GRI	Global Reporting Initiative
IAASB	International Auditing and Assurance Standards Board
IR	Inherent Risk
ISA	International Standards on Auditing
ISIN	International Securities Identification Number
ISSA	International Standard on Sustainability Assurance
INV	Inventory Ratio
NFRD	Non-Financial Reporting Directive
PIE	Public-Interest Entity
REC	Receivables Ratio

ROA	Return on Assets
S	Social pillar
SME	Small and Medium-sized Enterprise
SOX	Sarbanes-Oxley Act
TCFD	Task Force on Climate-related Financial Disclosures

1. Introduction

1.1 Background

Corporate sustainability reporting has undergone a fundamental transformation over the past decade. What was once a voluntary, largely unstructured disclosure practice has evolved into a mandatory, standardized, and externally verified regulatory obligation across the European Union. The centerpiece of this transformation is the Corporate Sustainability Reporting Directive (CSRD), adopted by the European Commission and entering into force progressively from financial year 2024 onwards. The CSRD replaces its predecessor, the Non-Financial Reporting Directive (NFRD), and introduces several structurally distinct requirements: mandatory reporting under the European Sustainability Reporting Standards (ESRS), a double materiality assessment framework, digital tagging of sustainability statements, value-chain disclosure requirements, and mandatory limited assurance over sustainability disclosures by statutory auditors or independent assurance service providers.

CSRD introduces qualitative changes that fundamentally alter the auditor's engagement scope. Auditors are now required to verify complex non-financial information, including Scope 3 greenhouse gas emissions, biodiversity impacts, supply-chain due diligence, and climate transition plans, which traditionally fell outside the boundaries of financial statement auditing. This expansion creates new technical demands, elevated legal exposure, and a structurally larger assurance engagement, all of which the foundational audit pricing literature predicts will be reflected in higher audit fees (Simunic, 1980; Houston et al., 1999).

1.2 Problematization

Despite the CSRD's implications for the auditing profession, the empirical literature on its economic consequences remains limited. Existing research on mandatory sustainability disclosure, primarily centered on the NFRD and analogous national mandates, has documented real compliance effects on firms' CSR activities (Fiechter et al., 2022), leaving open the question of whether CSRD-related reporting and assurance requirements affect audit pricing.

This gap is particularly problematic for three reasons. First, unlike the NFRD's comply-or-explain approach to non-financial disclosure, the CSRD creates a formal, legally binding audit obligation with associated liability exposure for assurance providers. Whether this structural shift translates into measurable audit fee increases is an open empirical question with direct practical relevance for corporate governance, financial planning, and regulatory impact assessment.

Second, the relationship between ESG performance and audit fees is theoretically ambiguous and empirically contested. Prior research documents both a risk-reduction channel, where stronger ESG performance lowers audit fees through improved internal controls and

information transparency (Song et al., 2023), and a complexity channel, where broader ESG involvement increases the scope of non-financial assertions auditors must verify, raising fees irrespective of performance level. Under the CSRD, the magnitude and consequences of this heterogeneity remain unexplored.

Third, there's limited direct empirical evidence on whether the CSRD's mandatory assurance requirement generates fee spillovers beyond the directly mandated cohort. The CSRD's value-chain orientation requires large in-scope firms to collect Scope 3 emissions data and supply-chain worker information from their suppliers. While the CSRD does not directly mandate SME reporting in the initial implementation period, its value-chain requirements may effectively cascade assurance demands to non-mandated smaller firms. Whether this mechanism translates into higher audit fees for listed SMEs is a question with significant policy relevance. Existing evidence on isomorphic compliance diffusion (DiMaggio & Powell, 1983) provides theoretical support for such spillovers, but direct empirical evidence is absent.

1.3 Research Questions

Grounded in the identified gaps in the literature, the primary objective of this study is to provide causal empirical evidence on whether the implementation of the CSRD leads to a significant increase in audit fees for listed European firms. Beyond evaluating this baseline market reaction, this thesis shifts away from a uniform treatment approach to investigate the heterogeneous effects of this regulatory shock. Specifically, it explores whether the CSRD-induced audit fee extension cascades down to listed SMEs via indirect supply-chain spillovers and institutional pressure mechanisms, despite their formal statutory exemptions during the initial rollout phase. Furthermore, the inquiry dissects the asymmetric cost distribution driven by industry footprints and organizational readiness, examining whether the positive audit fee premium is more pronounced for firms operating within carbon-intensive and environmentally sensitive industries relative to low-impact service sectors, and whether a firm's pre-existing sustainability maturity that captured by its pre-CSRD ESG performance can serve as an operational buffer to mitigate these regulatory pricing shocks.

1.4 Motivation

This study is motivated by both academic and practical considerations. From an academic perspective, the CSRD provides a useful quasi-experimental setting for examining the economic consequences of sustainability regulation. Its phased implementation and quantitative size thresholds create plausibly exogenous treatment and control groups, enabling a difference-in-differences research design. From a practitioner perspective, the audit fee consequences of the CSRD carry immediate relevance for multiple stakeholders. For firms, audit fees constitute a direct compliance cost: understanding whether the CSRD drives material fee increases and whether this effect is concentrated among low-ESG or

carbon-intensive firms, is essential for compliance budgeting and strategic ESG investment decisions. For audit firms, the study speaks to how the sustainability assurance market is being reshaped by mandatory requirements, with implications for pricing strategies, capacity planning, and specialist expertise development.

1.5 Contributions

This study makes three principal contributions to the literature. First, it provides causal empirical evidence on the effect of the CSRD on audit fees. While prior studies have examined the audit pricing consequences of voluntary CSR engagement (Du et al., 2020; Song et al., 2023) and the real compliance effects of the NFRD (Fiechter et al., 2022), no study has examined the CSRD's direct impact on audit pricing. By exploiting the CSRD's size-based treatment assignment in a difference-in-differences framework, this study fills a critical empirical gap in the rapidly growing literature on mandatory sustainability regulation.

Second, the study advances the understanding of heterogeneity in the audit pricing effects of sustainability regulation. By examining both aggregate ESG performance and separate Environmental, Social, and Governance pillar scores, the analysis shows that the overall ESG score does not significantly moderate the CSRD-related audit fee effect, while the Environmental and Social pillars do. This contributes to the literature by showing that audit pricing responses are more closely related to specific non-financial reporting dimensions than to aggregate ESG performance.

Third, the study examines whether CSRD-related audit fee effects extend beyond directly mandated large firms to listed SMEs. Although the evidence does not identify a distinct SME-specific spillover effect, the analysis provides a useful basis for future research on how CSRD pressures may evolve as SME reporting requirements become more relevant over time. The findings are also relevant for regulators, as they suggest that the direct audit fee burden is currently concentrated among mandated large firms, while potential indirect effects on smaller listed firms should continue to be monitored as implementation matures.

1.6 Findings

This study provides early empirical evidence on the audit fee consequences of CSRD implementation among listed European firms. The baseline DID results show that directly mandated firms experience an approximately 6.6% increase in audit fees relative to non-mandated firms after CSRD implementation, supporting the view that mandatory sustainability reporting and assurance requirements increase audit pricing. The evidence for spillover effects on listed SMEs is limited, as the SME-specific interaction term is statistically insignificant. Similarly, the results do not show that environmentally sensitive industries experience a significantly stronger audit fee increase during the early implementation period. Finally, the ESG analysis provides partial evidence that pre-existing sustainability maturity matters. While the aggregate ESG score is not statistically significant,

the Environmental and Social pillar scores significantly reduce the CSRD-related audit fee increase, suggesting that stronger environmental and social reporting readiness may help mitigate additional assurance costs.

1.7 Limitation

Several limitations should be considered when interpreting these findings. First, the post-CSRD observation window is confined to financial years 2024 and 2025, given the directive's phased entry into force from January 2024. The full audit pricing consequences of the CSRD may intensify as implementation matures, assurance standards stabilize, and auditors develop more detailed sector-specific pricing strategies; the insignificant finding for H3 in particular may reflect this temporal constraint rather than the absence of a true underlying mechanism. Second, the H2 design relies on listed micro-undertakings as the reference group. Although they provide a low-exposure benchmark, their limited sample size and structural differences from listed SMEs and large firms may reduce the comparability of the group-based analysis. Third, ESG score coverage is considerably lower than financial data coverage, restricting the H4 analyses to a subsample of 4,837 firm-year observations that may not be fully representative of smaller or less-covered firms, introducing potential selection bias.

2. Theoretical Background

2.1 Simunic's Audit Pricing Framework

The starting point for analysing the effect of CSRD implementation on audit fees is Simunic's audit pricing framework (Simunic, 1980). In Simunic's model, audit fees are determined by the cost of the audit effort and the auditor's expected exposure to third-party liability arising from defective financial statements. More specifically, under competitive conditions, the audit fee reflects the auditor's expected cost of supplying audit services, including both audit production costs and the auditor's expected share of losses arising from defective financial reporting. Audit fees therefore increase when the engagement requires greater audit effort or when the client is associated with higher expected liability exposure.

In the context of the European Union, the implementation of the Corporate Sustainability Reporting Directive (CSRD) is expected to affect both dimensions of audit pricing. First, CSRD significantly broadens the scope of corporate reporting by requiring firms to disclose more extensive, standardised, and decision-useful sustainability information. This expansion increases the volume and complexity of information that has to be examined, understood, and evaluated by assurance providers and auditors. Second, the introduction of mandatory sustainability reporting and assurance increases the risk environment around the engagement, especially when firms are still developing internal systems, reporting routines, and governance structures for non-financial information.

From a pricing perspective, CSRD is therefore likely to increase audit fees because auditors must devote more time, specialised expertise, and verification procedures to assess compliance with the new reporting regime. The audit process may also require coordination with sustainability specialists, additional testing of internal controls, and more extensive review of narrative and metric-based disclosures. As a result, Simunic's framework provides the central economic rationale for expecting a positive relationship between CSRD implementation and audit fees in the EU setting.

2.2 Audit Risk Theory

According to the Audit Risk Model (ARM), overall audit risk is a function of three parts: inherent risk, control risk, and detection risk. In this framework, auditors try to keep overall audit risk at an acceptably low level by adjusting their audit effort in response to the assessed risk of material misstatement, which is the joint product of IR and CR.

In the context of the CSRD, inherent risk is significantly higher. Unlike traditional ways of financial reporting, sustainability disclosures often depend on diverse data sources, complex non-financial metrics, and high levels of managerial judgment.This complexity arises because sustainability indicators vary widely in definitions and calculation methods, unlike financial data that follow more established standards (Harrer & Lehner, 2024). The forward looking nature of ESG information, such as carbon emission projections or climate related risks, creates a high level of estimation uncertainty and possibility of misstatement (Christensen et al., 2021; European Banking Authority [EBA], 2025; Bernow et al., 2019). Furthermore, control risk is expected to be high, particularly during the first stages of CSRD adoption. This is reflected in an AFM survey of 50 audit committees, which found that the average CSRD implementation status was only 64% in mid-2024, and that 70% of respondents considered enhanced internal control frameworks necessary to obtain reasonable assurance over CSRD information (AFM, 2024)

To compensate for the increased risk of material misstatement and to reduce detection risk to a level that preserves audit quality, auditors must increase their engagement effort. This intensification typically shows in higher levels of greater professional skepticism, the expansion of substantive testing (IAASB, 2025, ISA 200; ISA 330). Additionally, auditors may rely heavily on different subject-matter specialists and practitioners (e.g., environmental engineers or data analysts) to verify technical sustainability metrics (IAASB, 2024, ISSA 5000; Xu et al., 2026). As a consequence, the additional labor hours, specialized expertise, and many verification procedures required by the CSRD mean higher production costs for audit firms.

2.3 Agency Theory

Agency theory (Jensen & Meckling, 1976) posits that the separation of ownership and control creates a principal-agent problem characterised by information asymmetry and divergent

interests . To mitigate managerial opportunism, shareholders incur agency costs, primarily in the form of monitoring expenditures. External auditing serves as a key monitoring mechanism by providing independent verification of managerial assertions, thereby enhancing the credibility of corporate reporting and reducing information asymmetry (Healy & Palepu, 2001).

In the context of CSRD, however, this monitoring role becomes more complex. Although the directive is intended to enhance transparency, sustainability reporting may initially introduce new agency risks. Unlike standardised financial data, sustainability disclosures often involve significant managerial discretion, estimation, and subjective judgment, making them more vulnerable to impression management or greenwashing (Christensen et al., 2021; Diouf & Boiral, 2017; Cho et al., 2012; Merkl-Davies et al, 2011).

By requiring detailed disclosures on climate transition plans, sustainability due diligence, human-rights-related impacts, and sustainability-linked incentive schemes across the undertaking's own operations and value chain, the CSRD, as operationalized by the ESRS, expands the domain over which managers exercise discretion in ways that are often difficult for external stakeholders to independently observe or verify (Christensen et al., 2021; European Commission, 2024; ESMA, 2025). As a result, CSRD may initially intensify information asymmetry regarding firms' long-term sustainability risks and ethical performance. However, over time, more robust reporting processes and stronger internal controls over non-financial information may help reduce such asymmetry (Cuadrado-Ballesteros et al., 2017). In particular, improved internal controls over sustainability data may reduce assessed control risk and enhance the credibility of reported ESG information.

Therefore, the mandatory assurance requirements under CSRD can reshape the corporate governance landscape in two ways: they increase the need for external monitoring because of the complexity and strategic importance of non-financial information, while also encouraging firms to strengthen internal reporting systems that may mitigate these risks as implementation matures. Nevertheless, especially during the implementation stage, shareholders, particularly the institutional investors, are likely to value more rigorous and higher-quality assurance to enhance credibility and reduce the risk that such disclosures and symbolic or decoupled from underlying performance (Ioannou & Serafeim, 2017; Christensen et al., 2021; García-Sánchez et al., 2022; García-Sánchez et al., 2022). This increased demand for monitoring, together with the need for specialised audit procedures to verify complex ESG assertions, supports the expectation of higher audit fees following CSRD implementation.

2.4 Stakeholder Theory

While agency theory focuses primarily on the relationship between managers and shareholders, stakeholder theory broadens the perspective by recognising that firms are accountable to a wider set of stakeholders. These stakeholders include not only investors, but

also creditors, employees, customers, regulators, civil society organisations, and the public (Freeman, 1984).

Stakeholder theory predicts that firms are expected to disclose information and behave in ways that address the concerns and expectations of these diverse groups. Sustainability issues such as climate risk, human rights, and governance arrangements are relevant not just for shareholders, but also for many non-shareholder constituencies. Therefore, the expansion of reporting requirements under CSRD reflects a broader conception of corporate accountability in which firms must justify their actions and impacts to society at large.

As the audience for corporate reporting increases, auditors are no longer concerned only with the verification of financially material data in the traditional sense, but also with information that is relevant to a bigger set of stakeholders and subject to growing public scrutiny (Di Chiacchio et al., 2025; Harrer & Lehner, 2024). This puts greater expectation and pressure on firms to obtain credible assurance and on auditors to perform more extensive procedures. Stakeholder theory therefore supports the belief that CSRD implementation increases audit fees by expanding both the scope of accountability and the level of assurance expected from corporate reporting.

2.5 Signaling and Isomorphism

Signaling theory (Spence, 1973) is an idea that firms use expensive and credible signals to reduce information asymmetry and as a way to differentiate themselves from their lower quality peers. Under CSRD, high quality sustainability reporting and external assurance can function as such signals because they require substantial compliance and governance efforts that deliver higher quality (Clarkson et al., 2019).

As sustainability disclosure becomes more visible and comparable, firms may view rigorous assurance not just as a regulatory obligation but also as a strategic tool to show their transparency and credibility, and build trust (Krasodomska et al., 2025). Voluntary disclosure may also signal lower underlying risk and lead to lower cost of capital and higher market value, further encouraging firms to invest in robust assurance (Matsumura et al., 2014; Martínez-Ferrero et al., 2017; Bonetti et al., 2024; Dhaliwal et al., 2014). Accordingly, greater audit fees after CSRD implementation may reflect not only greater audit effort and compliance costs, but also firms' strategic willingness to use assurance to signal reporting quality, stronger governance, and lower perceived risk. Over time, the reduced perceived risk and enhanced reporting credibility associated with such signalling may also create audit fee benefits by lowering engagement risk and improving the efficiency of future audit work.

Isomorphism provides an institutional explanation for how firms and auditors respond to CSRD implementation within the EU regulatory environment. In general, isomorphism refers to the tendency of organisations operating in the same field to become increasingly similar over time as they adapt to common pressures, expectations, and constraints (DiMaggio &

Powell, 1983). In this study, two dimensions are particularly relevant: competitive isomorphism and mimetic isomorphism.

Competitive isomorphism arises when organisations adjust their structures and practices in response to market competition and efficiency pressures. Under CSRD, firms are faced with growing pressure to create credible sustainability reporting systems not only to satisfy regulators, but also to stay competitive in capital markets and product markets. Firms that fail to demonstrate reporting readiness or assurance quality may face higher financing costs, reduced investor confidence, or reputational disadvantages relative to their peers (Martínez-Ferrero et al., 2017; Bonetti et al., 2024; Dhaliwal et al., 2014; García-Sánchez et al., 2022; Nguyen et al., 2025). Similarly, audit firms compete in a sustainability assurance market and may standardise or adapt practices to secure jurisdictional legitimacy (DiMaggio & Powell, 1983; Strakova et al., 2025; Channuntapipat et al., 2020). These competitive dynamics encourage both companies and audit providers to develop similar reporting and assurance practices, which may increase the overall level of audit effort and create a rise in audit fees.

Mimetic isomorphism, by contrast, occurs when organisations imitate the practices of perceived leaders or peers, especially under uncertain conditions. CSRD introduces substantial uncertainty because many firms are still learning how to operationalise the new disclosure requirements, design internal controls for sustainability data, and coordinate compliance across business units. In such circumstances, firms are likely to model their reporting processes on those of leading companies or large multinational firms that are viewed as early adopters. Audit firms may behave similarly by adopting standardised methodologies, training models, specialist teams, and assurance approaches developed by bigger or better established market players (DiMaggio & Powell, 1983; Canning et al., 2019). As these practices diffuse across the market, reporting and assurance structures become more homogeneous.

These two forms of isomorphism help explain why the impact of CSRD on audit fees may become widespread across the EU market. Competitive pressures encourage firms to invest in credible reporting and assurance in order to keep its legitimacy and market position, while mimetic pressures lead firms and auditors to replicate the best emerging practices under uncertainty.

Together, these dynamics may contribute to a more uniform increase in assurance expectations, audit procedures, and pricing structures. Isomorphism therefore complements the economic and agency based theories by explaining how EU-wide institutional change may encourage convergent responses that could strengthen the audit fee effects of CSRD implementation.

3. Empirical Review

3.1 The Foundational Framework of Audit Fee Determinants

As established in the foundational model by Simunic (1980), audit fees are primarily determined by the auditor's resource consumption and the risk-premium associated with potential future liabilities. Widmann et al. (2021), in a systematic review of 121 studies, confirm that firm size, complexity, and inherent risk consistently explain the majority of variance in audit pricing across different jurisdictions.

However, in the contemporary reporting environment, auditors must extend this pricing framework to include non-traditional risk factors. With the increase in sustainability-related regulations and market demands, auditors are increasingly incorporating climate and ESG complexities into their pricing functions. Specifically, empirical evidence from Yu et al. (2023) and Tan et al. (2023) consistently indicates that corporate climate risks and carbon emissions increase information opacity and potential financial volatility. This requires auditors to exert greater effort to address the elevated audit risks, which ultimately results in higher audit fees. Garcia et al. (2021) confirm that CSR performance and disclosure constitute a distinct source of audit complexity. Auditors must verify a wider range of non-financial assertions with less mature internal controls and verification infrastructure than in financial reporting. Du et al. (2020) extend this by showing that CSR engagement reshapes the entire auditor–client contracting relationship, altering both auditor selection and fee structure.

Collectively, these findings establish the mechanism linking the CSRD's mandatory assurance requirement to higher audit fees. By mandating limited assurance over ESRS-standardized sustainability disclosures — including double materiality assessments, Scope 3 emissions, and biodiversity impacts — the CSRD structurally expands the scope of the audit engagement, increases the inherent risk of non-financial assertions, and elevates auditor legal exposure, all of which the Simunic (1980) framework predicts will be reflected in higher audit fees.

3.2 The Audit Profession's Response to CSRD

The audit profession's response to the CSRD is a critical empirical factor. Qualitative evidence by Jakobsson et al. (2025) indicates that the profession is undergoing a period of intense capacity building and internal training to handle the complexities of the CSRD. This adaptation phase involves significant start-up costs as auditors navigate the uncertainty of limited assurance requirements. Similar challenges are noted in Finland by Story (2025), where auditors face difficulties in providing assurance over novel climate and sustainability metrics. These professional hurdles suggest that the initial fee increases under the CSRD may be driven not only by client risk but also by the audit profession's own long learning curve and capacity expansion required to implement the ESRS.

3.3 Indirect Spillover Effects on SMEs

Evidence on the indirect compliance effects of sustainability regulation on non-mandated smaller firms is limited but theoretically coherent. While empirical studies primarily focus on mandated firms, their findings on anticipatory behavior highlight the power of market expectations. For instance, Fiechter et al. (2022) document strong anticipation effects of the EU CSR Directive, showing that in-scope firms significantly adjust their behaviors well before the entry-into-force date. Breijer et al. (2025) support this dynamic, showing that transparency improvements under the NFRD were concentrated among firms that began reporting voluntarily in advance of the mandate — responding proactively to market expectations rather than waiting for formal legal enforcement. This pre-emptive dynamic is directly applicable to listed SMEs under the CSRD: even where their legal disclosure obligations are deferred or exempt, supply-chain disclosure requirements embedded in the ESRS oblige large in-scope firms to collect Scope 3 and value-chain worker data from their suppliers, effectively cascading verification demands and market expectations to non-mandated SME counterparties.

The institutional mechanism amplifying this pressure is identified by DiMaggio and Powell (1983), whose framework of coercive and mimetic isomorphism predicts that smaller firms facing supply-chain demands from mandated large firms will emulate the assurance and reporting practices of their larger peers as a legitimacy-seeking strategy. Vander Bauwhede and Van Cauwenberge (2022) provide empirical support for the market dimension of this argument, demonstrating that sustainability assurance is positively associated with firm market value in a mandatory European reporting context, creating an economic incentive for non-mandated firms to voluntarily seek external verification. Clarkson et al. (2019) further document that voluntary CSR assurance is driven by credibility-signalling incentives, consistent with listed SMEs facing investor and supply-chain pressure to seek assurance even in the absence of a formal mandate.

3.4 Industry Environmental Sensitivity and Audit Pricing

A central pillar of the CSRD involves the rigorous disclosure of environmental impacts, which is hypothesized to affect "environmentally sensitive" industries disproportionately. Recent international studies support this "risk premium" logic. Yu et al. (2023) find that auditors charge significantly higher fees to clients with greater exposure to climate change risks to compensate for potential litigation and reputational threats. Hartlieb and Eierle (2024) corroborate this by showing that auditors specifically respond to clients' climate change-related external risks through adjusted effort and pricing.

Carbon emissions, a key metric under the ESRS, serve as a quantifiable proxy for this environmental risk. Tan et al. (2023) demonstrate a positive association between carbon emissions and audit fees, as high-emitting firms face greater regulatory scrutiny. Keller et al.

(2023) examine EU firms under the EU Emission Trading System and find a significant positive relationship between firms' carbon risk and audit fees. Their supplementary tests reveal that the fee premium is driven primarily by an auditor risk premium rather than pure effort increases, reflecting the elevated reputational and litigation exposure that auditors face when engaging with environmentally sensitive clients under regulatory scrutiny. These findings reinforce the expectation that industry-specific environmental footprints will moderate the impact of the CSRD on audit pricing.

Similarly, Ding et al. (2024) find that carbon risk is significantly priced by auditors in emerging markets, suggesting that carbon-intensive firms are universally perceived as higher-risk engagements. Complementing these risk-based arguments, Sun et al. (2025) provide evidence that superficial sustainability disclosures, specifically ESG washing behavior, significantly increase abnormal audit fees. They document that strategic ESG misrepresentation exacerbates agency costs and managerial short-termism, prompting auditors to expand substantive testing and demand higher risk premiums. This dynamic is particularly relevant for carbon-intensive firms under the CSRD, where unverified claims regarding emission reductions could trigger heightened skepticism for auditors and institutional investors.

3.5 The Moderating Role of ESG Maturity

The final strand of the empirical literature examines how a firm's pre-existing sustainability reporting infrastructure, also known as ESG maturity, moderates the relationship between regulatory mandates and audit pricing. The literature suggests that ESG performance significantly influences audit fees through risk-reduction and transparency channels. Song et al. (2023) find that high comprehensive ESG performance is associated with lower audit fees in China, supporting the view that auditors reward firms for superior internal controls and lower inherent risk. However, the efficacy of this buffer depends on the specific pillar. Song et al. (2023) emphasize that the reduction in audit pricing is primarily driven by the Social (S) and Governance (G) pillars, while the Environmental (E) pillar has an insignificant impact in their sample.

In an interview-based research, Rakipi et al. (2024) demonstrate that a firm's ESG maturity level directly determines the scope of internal audit involvement in sustainability governance. In low-maturity firms, internal audit is confined to narrow compliance checks. This implies that external auditors are left without a reliable internal assurance source, thereby expanding the external engagement scope accordingly. In contrast, in high-ESG firms, internal auditors actively provide assurance over ESG practices and reporting. Consequently, it can be theorized that firms with established voluntary reporting histories benefit from a learning-curve effect: prior institutional familiarity with non-financial data systems reduces the marginal verification effort required for ESRS compliance, and pre-existing data governance structures fundamentally reduce external auditors' inherent and control risk assessments.

4. Hypothesis Development

The foregoing theories collectively suggest that CSRD implementation is likely to increase audit fees by expanding reporting scope, increasing reporting complexity, and intensifying assurance demands.

Based on audit pricing theory, CSRD affects audit fees through audit effort, client complexity, and engagement risk. By requiring broader and more standardised sustainability disclosures, it increases the amount of information auditors must verify. At the same time, inherent and control risks increase due to a more comprehensive involvement of non-financial metrics and estimation uncertainty under the expanded sustainability reporting. Auditors also need to perform more extensive procedures, devote more labour hours, and rely more heavily on specialised expertise to maintain audit quality.

Additionally, based on Agency theory and stakeholder theory, CSRD increases the need for credible non-financial reporting to reduce information asymmetry and satisfy a broader group of stakeholders. In turn, firms are expected to demand more rigorous external assurance. Moreover, signaling theory predicts that some firms may be willing to accept higher assurance costs in order to signal transparency, reporting quality, and stronger governance. Taken together, these arguments suggest that firms subject to CSRD will face higher audit fees after implementation. Thus, the first hypothesis is as follows:

H1: *CSRD implementation leads to a significant increase in audit fees for mandated listed firms.*

Although CSRD directly applies to large listed entities, its value-chain orientation extends reporting pressures beyond the formally mandated group. Large firms subject to CSRD are expected to disclose sustainability-related impacts, risks, and dependencies across their supply chains, which can indirectly pressure SME suppliers and other smaller listed firms to improve the quality, consistency, and comparability of their sustainability information. In addition, the development of a simplified reporting framework for listed SMEs indicates that sustainability reporting expectations are also extending to smaller listed firms.

Theoretically, competitive isomorphism suggests that SMEs may adopt sustainability reporting and assurance practices to preserve supply-chain relationships, market access, and legitimacy. Mimetic isomorphism further implies that, under regulatory uncertainty, smaller firms may imitate the reporting and assurance behaviour of larger mandated firms. Even where full legal reporting obligations are deferred, these pressures can increase demand for external verification and more formalised reporting systems, thereby pushing audit fees upward beyond the directly mandated cohort. Therefore, the second hypothesis is proposed as follows:

H2: *CSRD implementation is positively associated with audit fees for both directly mandated large firms and listed SMEs.*

The effect of the CSRD is expected to vary significantly across different industrial sectors, driven primarily by the varying levels of Inherent Risk and Technical Complexity associated with environmental impacts. Within the framework of the Audit Risk Model (Houston et al., 1999), auditors assess the business risk of a client to determine the necessary level of assurance effort.

For firms operating in environmentally sensitive or carbon-intensive industries (e.g., energy, extractive industries, and heavy manufacturing), the reporting requirements under the CSRD are disproportionately high. These firms must provide data on Scope 3 emissions, biodiversity impacts, and resource circularity, which involves higher technical complexity compared to the service sector. According to Simunic's (1980) theory, this increased complexity directly necessitates higher expert labor hours, thereby driving up audit fees.

Furthermore, firms in high-exposure sectors face an elevated risk of Greenwashing litigation. Given the high stakes of EU Taxonomy alignment for institutional investors, any misstatement in a carbon-intensive firm's sustainability report carries significant reputational and legal liability for the auditor. Consequently, auditors are expected to charge a higher Risk Premium to compensate for this exposure. In contrast, for non-sensitive industries (e.g., technology or professional services), the sustainability reporting process is more administrative in nature, with lower inherent risks of technical misstatement. Therefore, it is predicted that the regulatory shock of the CSRD will lead to a more substantial fee increase for firms in environmentally sensitive sectors:

H3: *The positive effect of CSRD on audit fees is more pronounced for firms in environmentally sensitive industries than for firms in non-sensitive industries.*

Beyond industry-level factors, a firm's internal sustainability maturity, captured by its ESG Performance, is expected to moderate the relationship between the CSRD mandate and audit pricing. This hypothesis is grounded in Agency Theory and the concept of Information Opacity.

High-ESG firms typically possess mature internal control environments and established data collection infrastructures, often resulting from years of voluntary reporting under frameworks such as GRI or TCFD. For these firms, the transition to CSRD represents an incremental adjustment rather than a structural overhaul. Auditors of high-ESG firms benefit from a Learning Curve effect and knowledge spillovers, where existing familiarity with the client's non-financial data reduces the marginal effort required for ESRS compliance. From an audit risk perspective, these firms signal lower Control Risk, allowing auditors to rely more on internal systems and reduce substantive testing.

Conversely, low-ESG firms face a first-time compliance shock. These firms often lack the sophisticated governance mechanisms needed to capture the double materiality data required by the CSRD. For auditors, engagements with low-ESG laggards represent high-risk assignments. The lack of reliable prior data and weak internal controls over non-financial information force auditors to adopt a more intensive verification approach, involving extensive substantive procedures and specialized technical resources.

Additionally, consistent with Signaling Theory, auditors may perceive low ESG scores as a red flag for opportunistic management behavior or poor ethical culture, leading to a higher assessment of Inherent Risk. To mitigate the potential for regulatory sanctions and to cover the extensive catch-up effort required to bring these firms to CSRD standards, auditors will likely demand a significantly higher fee premium from low-ESG firms. Hence:

H4: *The positive effect of CSRD on audit fees is more pronounced for low-ESG firms than for high-ESG firms.*

5. Methodology

5.1 Empirical Design

This study examines whether the implementation of the Corporate Sustainability Reporting Directive (CSRD) affects audit fees among listed firms. Prior research on mandatory disclosure and regulatory shocks commonly relies on quasi-experimental research designs, particularly difference-in-differences (DID), to compare affected and unaffected firms before and after a regulatory change.

For example, Chen et al. (2018) examine China's mandatory CSR disclosure regulation using a DID design and further employ a propensity-score-matched sample to improve comparability between treated and control firms. In audit pricing research, regulatory changes such as SOX 404(b) have also been used to study differential audit fee shocks across firm size categories, while recent work on environmental policy and audit pricing exploits exogenous variation in environmental regulation to examine how environmental exposure affects audit fees (Ettredge et al., 2018). These studies suggest that a regulatory shock setting is appropriate for identifying changes in audit fees when the regulation affects some firms more directly than others.

Following this logic, the empirical analysis in this study is based on a firm-year panel dataset covering 2017–2025. The pre-treatment period is defined as 2017–2023, while the post-treatment period begins in 2024, when CSRD implementation starts to affect reporting obligations. The main empirical strategy relies on a DID framework, comparing changes in audit fees between firms subject to CSRD requirements and firms not directly subject to the mandate before and after CSRD implementation.

We conduct the analysis in several steps. First, we classify firms based on pre-treatment size, revenue, and employee thresholds in accordance with CSRD mandated large-undertaking thresholds under the Commission Delegated Directive (EU) 2023/2775. We then conduct pre-treatment univariate tests to compare treated and control firms and to provide descriptive evidence on baseline group differences. We then estimate a baseline DID model to test whether CSRD implementation increases audit fees for directly mandated firms. Next, we extend it to a multiple-treatment DID model to examine whether the effect differs between directly mandated large firms and listed SMEs, using micro-undertakings as the control group. We further extend the analysis using two additional approaches: a difference-in-difference-in-differences (DDD) specification to examine industry environmental sensitivity and moderated DID models to examine the role of pre-existing ESG performance. Finally, we assess robustness using PSM-DID (propensity score matching difference-in-differences), parallel trends, and placebo tests.

The main DID framework is appropriate because CSRD represents a regulatory shock that affects firms differently based on pre-treatment characteristics. Therefore, this design enables us to examine both whether CSRD increases audit fees and for which types of firms and under which conditions this effect is more pronounced.

5.2 Sample Construction and Treatment Definition

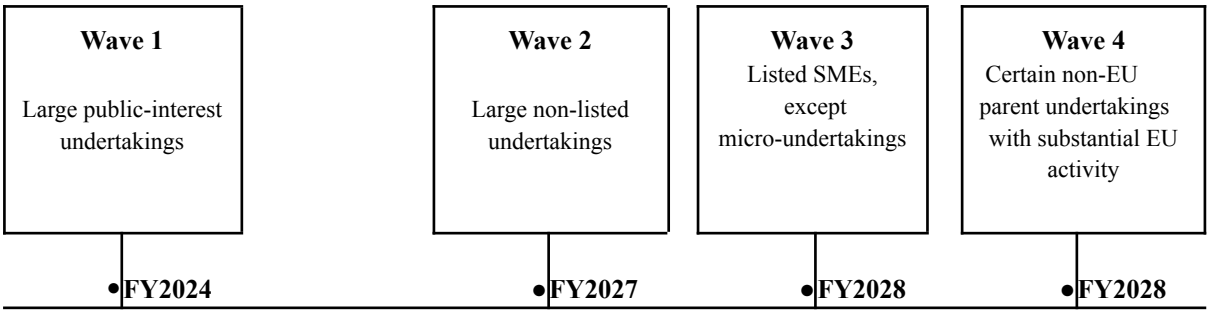
5.2.1 Sample Period and Post-CSRD Window

We obtain audit fee information from Bloomberg, and financial statements, firm characteristics, and ESG data from Capital IQ. Firms from the two databases are matched using ISIN identifiers. Our initial sample consists of all active publicly listed firms on primary markets in the EU-27 countries and Norway from FY2017 to FY2025, where CSRD or CSRD-aligned reporting requirements apply. The initial firm-level classification includes 2,304 large firms, 1,499 listed SMEs, and 226 micro-undertakings, with the remaining firms unclassified due to missing classification variables.

We restrict the sample to primary-market listings to avoid duplicate observations from secondary listings. Additionally, we exclude financial firms because they are subject to different regulatory, reporting, and audit environments. Finally, we exclude firm-year observations with missing data for the variables used in the analysis. The final regression sample consists of 10,772 firm-year observations from 1,877 unique firms, of which 9,002 observations and 1,451 firms are classified as directly mandated firms. To mitigate the impact of extreme values, all continuous variables are winsorized at the top and bottom 1%.

The CSRD is implemented in phases, as illustrated in Figure 1. The first CSRD wave applies to financial years beginning in 2024. Given the current availability of financial data, this study observes the early post-implementation period, so FY2017–FY2023 is defined as the pre-treatment period and FY2024–FY2025 as the post-treatment period.

Figure 1. CSRD reporting waves.



Note: The timeline is based on the European Commission's 2025 "stop-the-clock" proposal. Wave 1 firms report in 2025 for FY2024, while Wave 2 and Wave 3 are postponed to FY2027 and FY2028, respectively.
Source**:** European Commission (2025); Directive (EU) 2022/2464.

5.2.2 CSRD Scope and Group Formation

The CSRD reporting scope is linked to undertaking categories, including large undertakings and listed SMEs, while micro-undertakings are excluded from the listed-SME scope (Directive (EU) 2022/2464). We therefore classify firms using the official EU size criteria under the Accounting Directive, as amended by Directive (EU) 2023/2775 (European Commission, 2023). Specifically, firms are classified as large undertakings if they exceed at least two of the following thresholds: €25 million in total assets, €50 million in net turnover, and 250 employees.

Figure 2. CSRD undertaking categories

Classification	Total Assets	Net Revenue	Employees
Large undertakings	> €25,000,000	> €50,000,000	> 250
SMEs, excl. micro-undertakings	≤ €25,000,000	≤ €50,000,000	≤ 250
Micro-undertakings	≤ €450,000	≤ €900,000	≤ 10

Note: Listed SMEs are identified as firms that do not meet the large-undertaking thresholds and are not classified as micro-undertakings.
Source: (European Commission, 2023); Commission Delegated Directive (EU) 2023/2775.

Since the FY2024–FY2025 post-treatment window captures the initial CSRD implementation period, firms meeting the large-undertaking thresholds are treated as having direct CSRD-related reporting exposure in this study. We use 2023 firm characteristics to define treatment before the post-treatment period, so the classification is not influenced by CSRD implementation.

5.2.3 Treatment Classification

The main CSRD treatment group consists of firms classified as directly mandated large undertakings. This definition is used in H1, H3, and H4, where the objective is to estimate the audit fee effect for firms most directly exposed to CSRD requirements. All other firms serve as the control group in these analyses.

For the H2 analysis, we extend the baseline design by keeping the directly mandated large-firm group unchanged and splitting the original control group into non-mandated listed SMEs and listed micro-undertakings. Listed SMEs are treated as an additional treatment group, while listed micro-undertakings serve as the reference group. This allows us to examine whether CSRD-related audit fee effects are concentrated among directly mandated large firms or also extend to listed SMEs through potential spillover effects.

5.2.4 Moderating Variables for H3 and H4

For H3, we use a difference-in-difference-in-difference model by adding the third variable, *Env_sensitive*, defined as a binary indicator equal to one if a firm operates in an environmentally sensitive industry, and zero otherwise. The classification of these two groups is based on the Global Industry Classification Standard, environmentally sensitive industries are defined as firms classified under the Industrials, Energy, Materials, or Utilities. These sectors are characterised by disproportionately high environmental footprints and intensive Scope 3 emission dependencies.

For H4, the moderating variable is pre-existing ESG performance. The ESG score is treated as a continuous variable in the moderated DID specification, allowing the CSRD-induced audit fee effect to vary smoothly across the ESG performance distribution rather than imposing an arbitrary binary cutoff. To examine whether the moderating effect is concentrated in specific sustainability dimensions rather than the overall rating, we additionally employ the three individual pillar scores — Environmental (E), Social (S), and Governance (G). To avoid potential multicollinearity between the overall ESG score and individual pillar scores, each pillar specification is estimated independently.

5.3 Variables and Controls

Following prior studies on audit fee determinants (Simunic, 1980; Houston et al., 1999; Garcia et al., 2021), we include a set of control variables capturing client size, financial risk, operational complexity, and auditor characteristics.

Firm size is measured as the natural logarithm of total assets, which is expected to be positively associated with audit fees as larger firms require greater audit effort due to operational complexity. Leverage represents unsystematic risk, as firms with higher leverage are often exposed to more financial risk, potentially affecting their financial performance

(Gidage et al., 2025). Profitability is measured by return on assets (ROA), where less profitable firms are expected to face higher audit fees due to elevated engagement risk.

Liquidity is measured by the current ratio (CR), where lower liquidity may signal higher financial risk and thus higher fees. Audit complexity is captured by two variables: the receivables ratio (REC) and the inventory ratio (INV). Both ratios capture the relative weight of inherently risky asset categories that require more intensive substantive testing. Loss is a binary indicator equal to one if the firm reports a net loss in a year, reflecting incremental audit risk associated with financial distress. Big 4 is a binary indicator equal to one if the firm is audited by one of the four largest global audit firms, reflecting the quality premium associated with Big 4 engagements. Opinion is a binary indicator equal to one if the firm received a clean (unmodified) audit opinion, capturing reporting risk and auditor-client relationship quality.

Table 1. Variable definitions

Variable type	Variable Symbols	Definition
Dependent variable	AuditFee (log)	Natural logarithm of total audit-related fee, including core audit and non-audit fees
Control variables	Assets (log)	Firm size, the natural logarithm of total assets
	Big4	Equal to one if the auditor is international Big 4 and zero otherwise
	Lev	Firm leverage, the ratio of total debt to total assets
	ROA	Return on total assets, the ratio of net income to total assets
	REC	Ratio of receivable, the ratio of accounts receivable to total assets
	INV	Ratio of inventory, the ratio of inventory to total assets
	CR	The ratio of current assets to current liabilities
	Opinion	Equal to one for unqualified opinion and zero otherwise
	Loss	Equal to one for net loss and zero for net income

5.4 Model Specification

5.4.1 Baseline DID Model for H1

H1 predicts that CSRD implementation leads to an increase in audit fees for mandated listed firms. To test this hypothesis, we estimate the following model:

$$ln(AuditFee)_{i,t} = \beta_0 + \beta_1 Treat_i + \beta_2 Post_t + \beta_3 (Treat_i \times Post_t) + \Sigma Control_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad (1)$$

where $ln(AuditFee)_{i,t}$ is the natural logarithm of total audit fees for firm i in year t. $Post_t$ is an indicator variable equal to one for the post-CSRD period (2024–2025), and zero for the pre-treatment period (2017–2023). β_0 represents the intercept term; $\Sigma Control_{i,t}$ is a vector of

time-varying firm-level controls; λ_t denotes year fixed effects; μ_i denotes firm fixed effects; and $\varepsilon_{i,t}$ is the error term.

$Treat_i$ equals one for firms classified as directly mandated large undertakings based on 2023 firm characteristics, and zero otherwise. β_3 on $Treat_i \times Post_t$ is the coefficient of interest and captures the post-CSRD audit fee change for treated firms relative to control firms. A positive and significant β_3 supports H1.

5.4.2 Multiple Treatment DID Model for H2

To test the hypothesis that CSRD increases audit fees for both large firms and listed SMEs, we separate the treatment effect into listed large firms and SMEs. Listed micro-undertakings are used as the reference group because they are least exposed to direct CSRD mandates and spillover pressures, making them a suitable benchmark for identifying CSRD-related audit fee effects:

$$ln(AuditFee)_{i,t} = \beta_0 + \beta_1 Large_i + \beta_2 SME_i + \beta_3 Post + \beta_4 (Large_i \times Post_t) + \beta_5 (SME_i \times Post_t) + \Sigma Control_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad (2)$$

where $Large_i$ refers to the same directly mandated large-firm group captured by $Treat_i$ in Models (1), (3), and (4). In Model (2), it is specified separately to distinguish directly mandated large firms from listed SMEs as two treatment groups. SME_i equals one for listed SMEs. The remaining variables are defined as in Model (1).

The interaction terms $Large_i \times Post_t$ and $SME_i \times Post_t$ capture the post-CSRD change in audit fees for large firms and listed SMEs, respectively. A positive and significant β_5 supports the argument that CSRD also affects listed SMEs despite being non-mandated.

5.4.3 DDD Model for H3

H3 examines whether the CSRD-related increase in audit fees is stronger for firms operating in environmentally sensitive industries than for those in less sensitive sectors. To test this prediction, we extend the baseline DID framework to a DDD specification by introducing environmental industry sensitivity as a third moderating dimension:

$$ln(AuditFee)_{i,t} = \beta_0 + \beta_1 Treat_i + \beta_2 Post_t + \beta_3 Env\_sensitive_i + \beta_4 (Treat_i \times Post_t \times Env\_sensitive_i) + \beta_5 (Treat_i \times Post_t) + \beta_6 (Post_t \times Env\_sensitive_i) + \beta_7 (Treat_i \times Env\_sensitive_i) + \Sigma Control_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad (3)$$

where $Env\_sensitive_i$ is an indicator variable equal to one if firm i operates in an environmentally sensitive industry, defined as firms classified under the Industrials, Energy, Materials, or Utilities, and zero otherwise. The remaining variables are defined in Model (1).

The coefficient β_4 on the triple interaction term captures the incremental audit fee effect of CSRD for environmentally sensitive firms relative to other firms. A positive and significant β_4 would support H3, indicating that industry environmental exposure amplifies the CSRD-induced audit fee increase.

5.4.4 Moderated DID Model for H4

In this hypothesis, firms with weaker pre-existing ESG performance are expected to experience stronger audit fee increase due to higher auditor-assessed inherent and control risk. To test this prediction, we employ a moderated DID specification in which ESG performance serves as a continuous moderating variable interacted with the baseline DID term:

$$ln(AuditFee)_{i,t} = \beta_0 + \beta_1 Treat_i + \beta_2 Post_t + \beta_3 ESG\_Score_i + \beta_4(Treat_i \times Post_t \times ESG\_Score_i) + \beta_5(Treat_i \times Post_t) + \beta_6(Post_t \times ESG\_Score_i) + \beta_7(Treat_i \times ESG\_Score_i) + \Sigma Control_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad (4)$$

The coefficient of interest, β_4 , on the $Treat_i \times Post_t \times ESG\_Score_i$ captures the marginal change in the CSRD-induced audit fee effect per unit increase in pre-treatment ESG performance. A negative and significant β_4 would support H4, indicating that higher pre-CSRD ESG performance weakens the CSRD-related audit fee increase. Other variables are defined as in Model (1).

To examine whether the moderating effect is driven by specific sustainability dimensions rather than the overall rating, we re-estimate equation (4) separately for the Environmental (E), Social (S), and Governance (G) pillar scores, yielding Models (4.1), (4.2), and (4.3) respectively.

$$ln(AuditFee)_{i,t} = \alpha + \beta_1 Treat_i + \beta_2 Post_t + \beta_3 E\_Score_i + \beta_4(Treat_i \times Post_t \times E\_Score_i) + \beta_5(Treat_i \times Post_t) + \beta_6(Post_t \times E\_Score_i) + \beta_7(Treat_i \times E\_Score_i) + \Sigma Control_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad (4.1)$$

$$ln(AuditFee)_{i,t} = \alpha + \beta_1 Treat_i + \beta_2 Post_t + \beta_3 S\_Score_i + \beta_4(Treat_i \times Post_t \times S\_Score_i) + \beta_5(Treat_i \times Post_t) + \beta_6(Post_t \times S\_Score_i) + \beta_7(Treat_i \times S\_Score_i) + \Sigma Control_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad (4.2)$$

$$ln(AuditFee)_{i,t} = \alpha + \beta_1 Treat_i + \beta_2 Post_t + \beta_3 G\_Score_i + \beta_4(Treat_i \times Post_t \times G\_Score_i) + \beta_5(Treat_i \times Post_t) + \beta_6(Post_t \times G\_Score_i) + \beta_7(Treat_i \times G\_Score_i) + \Sigma Control_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad (4.3)$$

5.5 Fixed Effects, Standard Errors, and Model Diagnostics

All main regressions are estimated using a two-way fixed effects specification, including firm fixed effects and year fixed effects. Firm fixed effects control for time-invariant firm characteristics, such as firms' business models, baseline audit complexity, governance structure, and persistent reporting practices. Year fixed effects control for common shocks affecting all firms in a given year, such as macroeconomic conditions, regulatory developments, or audit market trends.

Noteworthily, since our treatment indicator is defined at the firm level and stays constant over time, it is absorbed by firm fixed effects in the fixed-effects specification. Our coefficient of interest remains to be the interaction term between the treatment and post-period indicators, which captures the differential change in audit fees for treated firms after CSRD implementation relative to control firms.

Standard errors are clustered at the firm level to allow for an unrestricted within-firm covariance structure over time, thereby adjusting for both heteroskedasticity and potential serial correlation (Bertrand et al., 2004; Petersen, 2009). Additional diagnostic tests for our main model, including variance inflation factor (VIF) diagnostics and the Sargan-Hansen specification test, are reported in Appendix A and Appendix B. VIF tests are conducted for our baseline specification to assess multicollinearity among the main control variables, the results indicate no severe multicollinearity concerns. The Sargan-Hansen test is used to assess the appropriateness of the fixed-effects specification relative to random effects. The test rejects the random-effects specification at the 1% level, supporting the use of firm fixed effects in the empirical analysis.

5.6 Robustness and Validity Tests

We use PSM-DID, parallel trends, and placebo tests to assess the robustness of the baseline findings to observable group differences, pre-existing trends, and placebo treatment timing.

First, we conduct a PSM-DID analysis as the main robustness test to mitigate concerns that the baseline DID results are affected by observable pre-treatment differences between treated and control firms, consistent with prior mandatory disclosure research using PSM-DID (Chen et al., 2018). We estimate propensity scores using pre-treatment firm characteristics that capture firm scale, audit complexity, financial risk, auditor characteristics, and baseline audit fee levels. Treated and control firms are then matched using nearest-neighbor matching without replacement, with a caliper and common support restriction. Matching without replacement prevents the same control firm from being repeatedly used, although it reduces the matched sample size. Finally, we re-estimate the DID model on the matched sample.

Second, we conduct a parallel trends test to assess the key identifying assumption of the DID design that treated and control firms would have followed similar audit fee trends prior to

CSRD. We perform tests by interacting the treatment indicator with year dummies, designating 2023 as the benchmark year (Bertrand and Mullainathan, 2003). We include indicator variables for Years −6, −5, −4, −3, −2, and −1 representing the pre-period (2017–2022), and Years +1 and +2 for the post-period (2024–2025). If the pre-treatment coefficients are insignificant and jointly indistinguishable from zero, this supports the baseline DID by suggesting similar audit fee trends between treated and control firms before CSRD implementation.

Third, we conduct a placebo test by assigning a pseudo-treatment year by setting the pseudo-treatment year to 2023, one year before the actual CSRD implementation (Chen et al., 2018). This test examines whether a treatment effect can be detected before the regulation becomes effective. If the placebo interaction term is insignificant, it would suggest that the baseline DID result is less likely to be driven by pre-existing differences or anticipation effects before CSRD implementation.

Together, these tests provide complementary evidence on the validity of the empirical strategy. The PSM-DID analysis addresses observable differences between treated and control firms, the parallel trends test evaluates the core DID assumption, and the placebo test examines whether the estimated effect appears before the actual implementation period.

6. Descriptive Statistics

6.1 Sample Distribution

Panel A of Table 2 presents the distribution of treatment and control firms across years and industry sectors. Panel A reports the year-by-year composition of the full sample, which comprises 10,772 firm-year observations in total, of which 9,002 (84%) belong to the treatment group of directly mandated large firms and 1,770 (16%) constitute the control group. The annual distribution is relatively stable across the pre-treatment period, with each year from 2017 to 2024 accounting for approximately 9% to 13% of total observations. The proportional split between treatment and control firms remains broadly consistent across all years, with treatment firms representing between 84% and 92% of annual observations throughout the sample period. This stability mitigates concerns that the composition of the two groups changes systematically over time in ways that could confound the DID estimates.

Panel B reports the industry sector distribution based on the GICS classification. The sample is dominated by Industrials, which account for 30% of total firm-year observations (2,796 treatment; 417 control), reflecting the broad scope of listed European manufacturing and industrial firms. Consumer Discretionary is the second largest sector at 14%, followed by Information Technology at 13% and Health Care at 11%. Several notable compositional differences emerge between the treatment and control groups. The treatment group is relatively more concentrated in Consumer Discretionary (16% vs. 8%), Industrials (31% vs. 24%), and Materials (10% vs. 6%), whereas the control group has considerably higher

representation in Health Care (22% vs. 8%) and Information Technology (20% vs. 11%). This pattern is broadly consistent with the CSRD's size-based treatment assignment, as larger firms tend to be concentrated in capital-intensive sectors, while smaller control firms are more prevalent in knowledge-intensive and healthcare industries.

Table 2. Sample distribution, by year and industry.

Panel A: Year	Total		Treatment		Control	
Year	**N**	**%**	**N**	**%**	**N**	**%**
2017	959	9%	819	9%	140	8%
2018	1035	10%	859	10%	176	10%
2019	1083	10%	903	10%	180	10%
2020	1148	11%	956	11%	192	11%
2021	1364	13%	1123	12%	241	14%
2022	1410	13%	1162	13%	248	14%
2023	1447	13%	1187	13%	260	15%
2024	1428	13%	1183	13%	245	14%
2025	898	8%	810	9%	88	5%
Total	**10772**	**100%**	**9002**	**100%**	**1770**	**100%**
Panel B: Industry						
Consumer Discretionary	1536	14%	1401	16%	135	8%
Consumer Staples	847	8%	752	8%	95	5%
Energy	250	2%	222	2%	28	2%
Health Care	1153	11%	764	8%	389	22%
Industrials	3213	30%	2796	31%	417	24%
Information Technology	1353	13%	997	11%	356	20%
Materials	966	9%	859	10%	107	6%
Real Estate	473	4%	329	4%	144	8%
Utilities	388	4%	350	4%	38	2%
Total	**10772**	**100%**	**9002**	**100%**	**1770**	**100%**

6.2 Summary Statistics

Table 3 presents the summary statistics for the full sample, comprising 10,772 firm-year observations for financial variables. Audit fees and total assets are reported in their raw, non-logarithmic form in this table, while the natural logarithm form is used in the regression analysis.

Audit fee has a mean of 2,033.61 thousand EUR and a median of 442.66 thousand EUR, with considerable right skew evident from the large standard deviation of 4,364.24 and a maximum value of 25,000 thousand EUR. This dispersion reflects the heterogeneous firm size distribution in the sample and motivates the use of the natural logarithm of audit fees as the dependent variable in all regression specifications.

Total assets exhibit a similarly skewed distribution, with a mean of approximately 5.14 million thousand EUR against a median of 547,129 thousand EUR, indicating the co-existence of large multinational corporations and smaller listed firms in the sample. The leverage ratio averages 0.20, while the mean current ratio of 1.92 suggests adequate but moderate short-term liquidity across the sample. ROA has a mean of 2.26% and a median of 3.34%, indicating that the sample is on average profitable, though the minimum value of −73.2% reflects the presence of firms with significant losses. This is consistent with the loss indicator variable showing a mean of 0.24, indicating that approximately 24% of firm-year observations report a net loss.

The receivables ratio (REC) and inventory ratio (INV) both average 0.13, capturing moderate levels of audit complexity across the sample. Regarding auditor characteristics, approximately 74% of firm-year observations are audited by a Big 4 firm, reflecting the relatively large firm composition of the sample, and 96% received a clean audit opinion, suggesting that modified opinions are uncommon in this European cross-country setting.
ESG-related variables are available for 4,837 firm-year observations, reflecting the more limited coverage of sustainability scores relative to financial data. The mean ESG score is 43.93 out of 100, with a standard deviation of 17.04 and a range from 9 to 87, indicating substantial heterogeneity in sustainability performance across sample firms. The three pillar scores — Environmental (mean 46.67), Social (mean 41.17), and Governance (mean 44.31) — are broadly comparable in magnitude, though the Environmental pillar displays the highest cross-sectional dispersion (SD = 21.30), consistent with greater variation in firms' environmental management practices relative to their social and governance counterparts.

Table 3. Summary statistics.

	N	Mean	Median	SD	Min	Max
Audit fee	10772	2033.61	442.66	4364.24	8.14	25000
Assets	10772	5135096.8	547129.36	11630123	232.16	54800000
REC	10772	0.13	0.11	0.1	0	0.59
INV	10772	0.13	0.10	0.13	0	0.71
Treat	10772	0.84	1.00	0.37	0	1
Post	10772	0.22	0.00	0.41	0	1
Leverage	10772	0.26	0.24	0.18	0	1.18
ROA	10772	2.26	3.34	8.93	-73.2	23.27
CR	10772	1.92	1.45	1.9	0.08	33.48
ESG Score	4837	43.93	42.00	17.04	9	87
E_Score	4837	46.67	45.00	21.3	5	94
S_Score	4837	41.17	38.00	17.72	6	88
G_Score	4837	44.31	42.00	15.65	12	85
Loss	10772	0.24	0.00	0.43	0	1
Big 4	10772	0.74	1.00	0.44	0	1
Opinion	10772	0.96	1.00	0.2	0	1

6.3 Univariate Tests

Table 4 reports the results of two-sample t-tests comparing mean differences between treated and control firms during the pre-treatment period. Treated firms have significantly higher audit fees and total assets than control firms, which is expected because treatment status is based on large-undertaking thresholds. Most other firm characteristics also differ significantly between the two groups, while accounts receivable intensity is only marginally significant. These results indicate observable pre-treatment differences and therefore support the use of control variables, fixed effects, and PSM-DID robustness tests in the subsequent analysis.

Table 4. Pre-treatment tests of differences in means.

	N (Treatment)	Mean (1)	N (Control)	Mean (0)	Mean Dif. (0-1)	p-value
Audit Fee (log)	7009	13.394	1437	10.951	-2.443	0.000***
Assets (log)	7009	13.877	1437	9.959	-3.919	0.000***
Leverage	7009	.268	1437	0.201	-.068	0.000***
ROA	7009	4.098	1437	-6.359	-10.457	0.000***
Loss	7009	.172	1437	0.565	.394	0.000***
REC	7009	.136	1437	0.130	-.005	0.084*
INV	7009	.132	1437	0.123	-.009	0.018**
Big4	7009	.808	1437	0.510	-.299	0.000***
Opinion	7009	.977	1437	0.958	-.019	0.000***
CR	7009	1.736	1437	2.817	1.082	0.000***

6.4 Correlation Matrix

Table 5 reports pairwise correlations among the main variables. The strongest correlation in the matrix is between audit fee and total assets ($r = 0.822$, $p < 0.01$), confirming that firm size is the dominant determinant of audit pricing, consistent with the established audit fee literature. ESG score is also positively and significantly correlated with audit fees ($r = 0.438$, $p < 0.01$), providing preliminary univariate support for the notion that firms with greater sustainability engagement are associated with higher audit fees, though the direction of this relationship will be examined more rigorously in the multivariate setting. The strong positive correlation between ESG score and total assets ($r = 0.506$, $p < 0.01$) further indicates that larger firms tend to have higher ESG performance, highlighting the importance of controlling for firm size.

Turning to the remaining control variables, leverage and Big 4 auditor appointment are both positively associated with audit fees ($r = 0.058$ and $r = 0.192$ respectively, both $p < 0.01$), consistent with higher financial risk and greater auditor quality commanding fee premiums. By contrast, the inventory ratio, current ratio, and account receivables ratio are negatively correlated with audit fees, which may reflect the composition of the sample, where asset-light service firms tend to have lower audit complexity in certain dimensions. ROA and loss exhibit a strong positive correlation with each other ($r = 0.578$, $p < 0.01$), which is expected

given that profitability directly determines whether a firm reports a loss; both are retained as separate controls given their distinct theoretical roles in the audit pricing model.

Regarding multicollinearity concerns, the highest inter-predictor correlation is between Big 4 and Opinion ($r = 0.456$, $p < 0.01$), suggesting that Big 4 auditors are more likely to issue clean opinions, which may reflect higher audit quality rather than lenience. All other inter-predictor correlations remain below 0.30, and no pair of regressors approaches the conventional threshold of concern ($r > 0.70$), suggesting that multicollinearity is unlikely to pose a significant threat to the validity of the regression estimates.

Table 5. Pairwise correlations.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) Audit fee	1.000										
(2) Assets	0.822***	1.000									
(3) ESG_SCORE	0.438***	0.506***	1.000								
(4) REC	-0.063***	-0.085***	0.050***	1.000							
(5) INV	-0.122***	-0.121***	-0.103***	0.035***	1.000						
(6) Leverage	0.058***	0.072***	0.077***	-0.151***	-0.040***	1.000					
(7) ROA	0.101***	0.104***	0.201***	0.162***	0.045***	-0.056***	1.000				
(8) CR	-0.106***	-0.086***	-0.228***	-0.110***	0.092***	-0.271***	-0.043***	1.000			
(9) Loss	0.121***	0.137***	0.226***	0.130***	0.028***	-0.050***	0.578***	-0.058***	1.000		
(10) Big 4	0.192***	0.228***	0.216***	-0.080***	-0.114***	0.129***	0.077***	-0.116***	0.102***	1.000	
(11) Opinion	0.048***	0.075***	0.068***	-0.014**	-0.011*	0.023**	0.056***	-0.025**	0.080***	0.456***	1.000

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

7. Empirical Results

7.1 Baseline Effect of CSRD

Table 6 reports the baseline difference-in-differences results for H1. As previously discussed in section 5.5, because treatment status is time-invariant, the standalone *Treat* variable is absorbed by firm fixed effects and is therefore not reported separately.

The coefficient on the DID interaction term, *Treat* × *Post,* is positive and statistically significant at the 5% level. Specifically, the estimated coefficient is 0.0659, with a p-value of 0.030. This indicates that, after CSRD implementation, mandated listed firms experienced a larger increase in audit fees relative to non-mandated firms. The coefficient implies an approximate increase of 6.6% in total audit-related fees after CSRD implementation. Given

that the mean audit fee is 2,033.61 thousand EUR, a 6.6% increase corresponds to approximately EUR 134,200 in additional annual audit-related fees for the average firm. This result provides support for H1, which predicts that CSRD implementation leads to an increase in audit fees for mandated listed firms. In addition, the adjusted R-squared is 0.319, suggesting that the model explains approximately 31.9% of the variation in audit fees, which indicates a reasonable explanatory power for a firm-level panel regression.

The control variables generally behave as expected. Firm size is positively and highly significantly associated with audit fees. This is consistent with the expectation that larger firms require more audit effort due to greater operational complexity. The coefficient on *Big4* is also positive and significant, suggesting that firms audited by Big 4 auditors pay higher fees. Firms reporting a *loss* are associated with higher audit fees, which may reflect increased audit risk. In contrast, *current ratio* and *ROA* are negatively and significantly associated with audit fees, while *leverage*, *inventory ratio*, and *accounts receivable ratio* are not statistically significant in this specification.

Overall, the baseline DID evidence suggests that CSRD-mandated firms experienced a statistically and economically meaningful increase in audit fees after implementation. This provides initial support for H1. Additional PSM-DID, parallel-trends, and placebo analyses are further used to assess the robustness of this baseline finding.

Table 6. Regression results for Model (1) – (3).

	Model (1)	Model (2)	Model (3)
Post	.186***	.194	0.220***
	(.035)	(.222)	(0.038)
Treat × Post	**.066****		0.031
	(.03)		(0.036)
Large × Post		.058	
		(.221)	
SMEs × Post		**-.008**	
		(.222)	
Large × Post - SMEs × Post		**.066****	
		(.03)	
Post × Env_sensitive			-0.008
			(0.054)
Treat × Post × Env_sensitive			**0.030**
			(0.059)
Assets (log)	.523***	.523***	0.509***
	(.025)	(.025)	(0.025)
Leverage	-.06	-.06	-0.074
	(.067)	(.067)	(0.067)
ROA	-.005***	-.005***	-0.005***
	(.001)	(.001)	(0.001)
LOSS	.057***	.057***	0.057***
	(.014)	(.014)	(0.014)
REC	.13	.13	0.139
	(.174)	(.174)	(0.172)
INV	.217	.217	0.168

	(.154)	(.155)	(0.153)
Big4	.099***	.099***	0.104***
	(.028)	(.029)	(0.028)
Opinion	-.066**	-.066**	-0.061**
	(.031)	(.031)	(0.030)
CR	-.015***	-.015***	-0.014***
	(.006)	(.006)	(0.005)
Constant	6.038***	6.038***	-0.709**
	(.336)	(.336)	(0.336)
Observations	10772	10772	10772
Adj. R^2	.319	.318	0.307
Method	FE	FE	FE
Year fixed effects	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes

Standard errors are in parentheses
**** p<.01, ** p<.05, * p<.1*
Note: For Model (1), ***Treat*** refers to CSRD-mandated large firms. In Model (2), the same group is captured by ***Large*** to distinguish it from listed SMEs; listed micro firms serve as the reference group.

7.2 Effects across Large Firms and Listed SMEs

The interaction terms *Large* × *Post* and *SMEs* × *Post* capture whether directly mandated large firms and listed SMEs experience different post-CSRD audit fee changes relative to the reference group, listed micro-undertakings. The coefficient on *Large* × *Post* is 0.058 and statistically insignificant, suggesting that the additional audit fee change for directly mandated large firms relative to the reference group is not statistically distinguishable from zero.

In addition, the coefficient on *SMEs* × *Post* is −0.008 and also statistically insignificant, indicating no evidence that listed SMEs experience a distinct post-CSRD audit fee change relative to the reference group. However, the contrast Large × *Post* − *SMEs* × *Post* is positive and statistically significant at the 5% level, with a coefficient of 0.066. This indicates that mandated large firms experienced an additional audit fee increase of approximately 6.6% relative to listed SMEs in the post-CSRD period.

7.3 Industry Environmental Sensitivity in Audit Pricing

The primary variable of interest is the triple interaction term, *Treat* × *Post* × *Env_sensitive.* As shown in Model (3), despite the coefficient for the triple interaction term, β_4, is positive at 0.030, it lacks statistical significance ($p > 0.10$). Consequently, we find no robust empirical evidence that industry environmental sensitivity significantly amplifies the audit pricing shock caused by the CSRD during the initial implementation phase.

The two-way interaction between the post-period and environmental sensitivity, *Post* × *Env_sensitive*, is similarly negligible in magnitude and statistically insignificant ($\beta_6 = -0.008$, $p = 0.89$), providing no indication that audit fee levels in environmentally sensitive industries diverged from other sectors following CSRD adoption.

7.4 ESG Performance in CSRD-Related Audit Fees

7.4.1 Aggregate ESG Performance

Table 7 reports the result for Model (4), the coefficient of *Treat* × *Post* × *ESG_Score* is negative at –0.012. However, this result is not statistically significant ($p > 0.10$), indicating that when looking at the aggregate ESG score, there is no robust evidence that overall sustainability performance mitigates the impact of CSRD on audit fees. This suggests that the mitigating effect of sustainability maturity may be driven by specific dimensions rather than a firm's broad ESG profile.

7.4.2 Individual Pillar Scores

The results for Model (4.1), (4.2), and (4.3) are reported alongside Model (4) in Table 7. The interaction term for E pillar, *Treat* × *Post* × *E_Score*, yields a coefficient of –0.016, which is statistically significant at the 1% level. This suggests that for every one-unit increase in a firm's environmental score, the premium on audit fees associated with the CSRD implementation is reduced by 1.6%. These findings provide strong empirical support for H4, specifically within the environmental dimension.

Similarly, *Treat* × *Post* × *S_Score* yields a coefficient of –0.015 and is statistically significant at the 5% level. This indicates that higher social performance significantly attenuates the upward pressure on audit pricing, further supporting the mitigation argument.

In contrast, the coefficient on the G pillar interaction term, *Treat* × *Post* × *G_Score*, is near zero at –0.004 and statistically insignificant. This suggests that pre-existing governance performance does not provide an incremental mitigating effect on CSRD-induced audit fee increases, likely because baseline governance standards were already well-established among listed European firms prior to the directive.

7.4.3 Summary of Findings

In summary, the findings provide partial support for Hypothesis 4. While the aggregate ESG score does not show a significant moderating effect, the individual pillars reveal that Environmental and Social performance serve as significant moderators. The high statistical significance in Model (4.1) is particularly relevant given the CSRD's heavy emphasis on climate-related disclosures. The results suggest that firms with established environmental and social reporting frameworks were able to mitigate the regulatory shock to their audit costs, likely due to lower auditor-perceived risk and lower substantive testing requirements.

Table 7. Regression results for Model (4) – (4.3).

	Model (4)	Model (4.1)	Model (4.2)	Model (4.3)

Post	-0.192	-0.214*	-0.168	-0.032
	(0.197)	(0.130)	(0.165)	(0.242)
Treat × Post	0.377*	0.392***	0.376**	0.230
	(0.197)	(0.129)	(0.165)	(0.245)
ESG_Score	-0.008			
	(0.008)			
Treat × ESG_Score	0.010			
	(0.008)			
Post × ESG_Score	0.013			
	(0.008)			
Treat × Post × ESG_Score	**-0.012**			
	(0.008)			
E_Score		-0.008		
		(0.006)		
Treat × E_Score		0.009		
		(0.006)		
Post × E_Score		0.017***		
		(0.005)		
Treat × Post × E_Score		**-0.016*** **		
		(0.005)		
S_Score			-0.004	
			(0.008)	
Treat × S_Score			0.006	
			(0.008)	
Post × S_Score			0.015**	
			(0.007)	
Treat × Post × S_Score			**-0.015** **	
			(0.007)	
G_Score				-0.005
				(0.009)
Treat × G_Score				0.006
				(0.009)
Post × G_Score				0.005
				(0.009)
Treat × Post × G_Score				**-0.004**
				(0.009)
Assets(log)	0.450***	0.461***	0.449***	0.447***
	(0.044)	(0.044)	(0.044)	(0.044)
Leverage	-0.027	-0.029	-0.032	-0.034
	(0.142)	(0.142)	(0.142)	(0.142)
ROA	-0.003	-0.003	-0.003	-0.003
	(0.002)	(0.002)	(0.002)	(0.002)
Loss	0.062***	0.061***	0.062***	0.062***
	(0.019)	(0.020)	(0.019)	(0.019)
REC	0.206	0.217	0.190	0.202
	(0.290)	(0.288)	(0.290)	(0.293)
INV	0.297	0.315	0.296	0.300
	(0.300)	(0.301)	(0.300)	(0.301)

Big4	0.055	0.051	0.056	0.056
	(0.055)	(0.055)	(0.055)	(0.055)
Opinion	-0.081	-0.082	-0.083	-0.080
	(0.059)	(0.059)	(0.058)	(0.059)
CR	-0.018*	-0.018*	-0.019*	-0.017*
	(0.010)	(0.010)	(0.010)	(0.010)
Constant	0.520	0.407	0.548	0.580
	(0.635)	(0.641)	(0.634)	(0.631)
Observations	4837	4837	4837	4837
Adj. R^2	0.280	0.281	0.280	0.279
Method	FE	FE	FE	FE
Year fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes

Standard errors are in parentheses

**** p<.01, ** p<.05, * p<.1*

7.5 Robustenss Check

7.5.1 Propensity Score Matched Sample

The PSM-DID regression is estimated on a matched sample of 2,201 firm-year observations from 492 unique firms, as documented in Appendix C. We conduct a balance test to assess whether matching improves the comparability between treated and control firms, reported in Table 8. The matching procedure substantially improves the balance between the treatment and control groups. After matching, the absolute values of the standardized bias for all matching variables are below 10%, and the t-tests are statistically insignificant for all covariates. In addition, the pseudo R^2 decreases from 0.675 before matching to 0.005 after matching, while the mean bias falls from 83.6 to 3.8. These results indicate that there is no systematic difference in observable pre-treatment characteristics between the matched treatment and control firms (Chen et al., 2021; Zang et al., 2020). Therefore, the matched sample is suitable for the subsequent PSM-DID analysis

Table 8. Balance test of propensity score matching (PSM).

Panel A: Balance test result (a)

Variable	Unmatched	Mean		%Bias	%Reduct | Bias |	t-test	
	Matched	Treated	Control			t	*p* > | t |
Audit Fees (log)	U	13.169	10.89	170.9	95.5	27.61	0.000
	M	11.195	11.297	**-7.7**		-0.66	**0.513**

Assets(log)	U	13.523	9.7563	223.8	97.8	36.48	0.000	
	M	10.745	10.829	**-5.0**		-0.59	**0.553**	
Leverage	U	.26786	.21682	28.8	79.0	5.52	0.000	
	M	.23782	.24856	**-6.1**		-0.39	**0.697**	
ROA	U	3.8995	-8.0754	102.3	99.9	24.92	0.000	
	M	1.0904	1.0979	**-0.1**		-0.01	**0.995**	
Loss	U	.18604	.59528	-127.7	98.9	-25.87	0.000	
	M	.36132	.35668	**1.4**		0.10	**0.923**	
REC	U	.14043	.11995	19.5	90.7	3.61	0.000	
	M	.14089	.13898	**1.8**		0.13	**0.900**	
INV	U	.13379	.11459	14.8	57.6	2.68	0.007	
	M	.15079	.14264	**6.3**		0.36	**0.716**	
Big4	U	.75063	.46454	68.9	99.0	12.96	0.000	
	M	.43594	.43299	**0.7**		0.05	**0.963**	
Opinion	U	.94776	.90118	28.4	93.7	5.64	0.000	
	M	.90574	.9028	**1.8**		0.12	**0.908**	
CR	U	1.8158	3.1031	-51.4	86.0	-11.79	0.000	
	M	2.4289	2.6091	**-7.2**		-0.55	**0.583**	

Panel B: Balance test result (b)

	Ps R^2	LR chi2	p>chi2	MeanBias	MedBias	B	R	%Var
Unmatched	0.675	1341.40	0.000	83.6	60.1	244.4*	1.65	90
Matched	0.005	1.26	1.000	3.8	3.4	16.1	0.77	30

The PSM-DID model is first re-estimated using pooled OLS on the matched sample. From the column (1) in Table 9, we can see that the coefficient on *Treat* × *Post* is positive and statistically significant, with a value of 0.219 and a p-value of 0.021. This corresponds to an additional audit fee increase of approximately 21.9% for treated firms relative to matched control firms in the post-CSRD period.

We then re-estimate the model using firm fixed effects to further control for time-invariant firm-specific characteristics, as reported in column (2) in Table 9. The coefficient on *Treat* × *Post* remains positive and statistically significant, with a value of 0.161 and a p-value of 0.005, which corresponds to an additional audit fee increase of approximately 16.1%. Although the coefficient is smaller than in the pooled OLS specification, it remains statistically significant, suggesting that the positive CSRD-related audit fee effect persists after controlling for unobserved firm-level heterogeneity. The smaller standard error in this specification also indicates that the effect is estimated more precisely once time-invariant firm characteristics are controlled for.

Overall, the PSM-DID results suggest that the positive audit fee effect is unlikely to be driven solely by treated firms' observable pre-treatment characteristics, such as being larger, more complex, or having higher audit fees before CSRD implementation. Instead, the continued significance of *Treat* × *Post* indicates that CSRD implementation is associated with an additional increase in audit fees for mandated large firms.

Table 9. Robustness check with PSM-DID, PSM sample.

	PSM-DID (1) POLS	PSM-DID (2) FE
Treat	-.229**	
	(.106)	
Post	.281***	.305***
	(.085)	(.06)
Treat × Post	**.219****	**.161*****
	(.095)	**(.057)**
Other firm-level controls	Yes	Yes
Observations	2201	2201
Adj. R^2	.516	.328
Method	POLS	FE
Year fixed effects	Yes	Yes
Firm fixed effects	No	Yes

Standard errors are in parentheses
*** p<.01, ** p<.05, * p<.1*
Note: Control variables are included but omitted for brevity. Full results are reported in Appendix D.

7.5.2 Parallel Trends Test

We report the result for the test in Table 10. The pre-treatment coefficients are close to zero and statistically insignificant, ranging from −0.063 to 0.068. The coefficient for Year −2 is marginally significant at the 10% level; however, the remaining pre-treatment coefficients are insignificant and do not show a consistent upward or downward trend. Following implementation, the coefficients turn positive, and increase from 0.036 in 2024 to 0.076 in 2025. While these post-treatment coefficients do not reach conventional levels of statistical significance, the upward pattern is marginally consistent with the expected positive effect of CSRD on audit fees.

A joint F-test also shows that these coefficients are not significantly different from zero ($F = 1.51$, $p = 0.1701$), suggesting no clear evidence of differential pre-treatment trends between treated and control firms, and therefore supports the parallel-trends assumption.

The results do not provide strong evidence against the parallel-trends assumption. Although the coefficient for Year −2 is marginally significant, most pre-treatment coefficients are statistically insignificant and show no systematic trend. In addition, the joint F-test fails to reject the null hypothesis that the pre-treatment coefficients are jointly equal to zero, providing some support for the DID assumption that treated and control firms followed

similar audit fee trends before CSRD. Therefore, the results should be interpreted as broadly consistent with parallel trends, while still with some caution.

Table 10: Parallel trend test.

	Parallel Trend
Treat × Year −6	.068
	(.059)
Treat × Year −5	.002
	(.05)
Treat × Year −4	-.043
	(.044)
Treat × Year −3	-.041
	(.041)
Treat × Year −2	-.063*
	(.034)
Treat × Year −1	-.029
	(.029)
Treat × Year +1	**.036**
	(.028)
Treat × Year +2	**.076**
	(.048)
Other firm-level controls	Yes
Observations	10772
Adj. R^2	.319
Method	FE
Year fixed effects	Yes
Firm fixed effects	Yes

Standard errors are in parentheses
*** p<.01, ** p<.05, * p<.1*
Note: Control variables are included but omitted for brevity. Full results are reported in Appendix E.

7.5.3 Placebo Test

The placebo test results are reported in Table 11. The coefficient on *Treat* × *Post* is 0.035 and statistically insignificant. This indicates that CSRD-mandated large firms DID not experience a significant differential increase in audit fees relative to control firms in the placebo period. Therefore, the placebo test provides no evidence of a pre-existing treatment effect and supports the validity of the DID design.

Table 11. Placebo test result.

	Placebo test
Post	.085***
	(.032)
Treat × Post	**.035**
	(.029)
Other firm-level controls	Yes
Observations	8446
Adj. R^2	.251
Method	FE
Year fixed effects	Yes
Firm fixed effects	Yes

Standard errors are in parentheses
*** p<.01, ** p<.05, * p<.1*
Note: Control variables are included but omitted for brevity. Full results are reported in Appendix F.

8. Empirical Analysis

8.1 CSRD Implementation and Audit Fee Increases

Having discovered the results of our baseline DID regression, we now explore the impact of the CSRD implementation on directly mandated companies. The coefficient on DID interaction term *Treat* × *Post* is positive at 0.066 and statistically significant, which provides support to our hypothesis 1.

Under Simunic's audit pricing framework, audit fees reflect both audit production costs and expected liability exposure (Simunic, 1980). CSRD expands the scope of corporate reporting by requiring more extensive, standardised, and decision-useful sustainability disclosures. As a result, auditors are likely to face greater verification demands, more complex reporting environments, and higher engagement effort. The positive coefficient on *Treat* × *Post* is therefore consistent with the argument that CSRD increases audit fees through higher audit effort and client complexity.

The result is also consistent with audit risk theory. Sustainability disclosures often involve non-financial metrics, forward-looking information, estimation uncertainty, and managerial judgment, which can increase inherent and control risk (Houston et al., 1999; Christensen et al., 2012). To maintain audit quality, auditors may need to expand substantive testing, exercise greater professional scepticism, and rely on sustainability or data specialists, increasing labour hours and audit production costs (IAASB, ISA 200; ISA 330; ISSA 5000).

Furthermore, the finding supports the agency and stakeholder-based arguments underlying H1. CSRD increases the demand for credible external verification by reducing information asymmetry and responding to broader stakeholder expectations for reliable non-financial reporting (Jensen & Meckling, 1976; Healy & Palepu, 2001; Freeman, 1984).

The robustness tests further strengthen the interpretation. In the PSM-DID analysis, *Treat* × *Post* remains positive and statistically significant under both the pooled OLS and fixed-effects specifications after matching treated and control firms on observable pre-treatment characteristics, suggesting that the result is unlikely to be driven solely by treated firms being larger, more complex, or having higher audit fees before CSRD implementation.

The placebo test also reports an insignificant placebo interaction term when designating a regulation year in 2023 (one year prior to actual implementation), providing no evidence of a pre-existing treatment effect. Although the parallel trends test should be interpreted with some caution due to one marginal evidence at the 10% level, most pre-treatment coefficients are insignificant and the joint F-test fails to reject parallel trends, suggesting that treated and control firms followed broadly similar audit fee trends before CSRD, strengthening the interpretation that the positive audit fee effect in H1 is more likely driven by CSRD implementation rather than pre-existing trend differences.

Overall, the evidence supports H1 and suggests that CSRD implementation is associated with higher audit fees for mandated listed firms.

8.2 Spillover Effect for listed SMEs

As discussed in section 7.2, the coefficient on *SMEs* × *Post* is negative and statistically insignificant, indicating that the post-period audit fee increase for SMEs is not statistically different from the reference group. Hence, the results do not provide strong evidence of a distinct SME-specific spillover effect. This may partly reflect the relatively small number of listed micro firms in the EU listed-firm setting, which limits the strength of the reference group comparison. The significant difference between *Large* × *Post* and *SMEs* × *Post* is consistent with the baseline finding that the audit fee effect is concentrated among directly mandated large firms, but it should not be interpreted as evidence of SME spillover.

While prior studies suggest that sustainability reporting regulation can generate anticipation or market-pressure effects beyond directly mandated firms (Fiechter et al., 2022; Breijer et al., 2025), such effects may not arise uniformly or immediately.

Kosi and Relard (2024) show that firms newly expected to fall under CSRD, but not previously subject to NFRD, did not significantly increase voluntary sustainability reporting, suggesting that preparation effects may be weaker for firms without prior mandatory reporting experience. In addition, the EU value-chain cap may limit the extent of sustainability information that large firms can request from SMEs, potentially weakening or delaying the transmission of CSRD-related pressure into SME audit fees (European Commission, 2025). Therefore, the findings suggest that the audit fee effect is primarily concentrated among directly mandated large firms, while the evidence for spillover effects on listed SMEs remains limited.

8.3 Analysis of Industry Environmental Sensitivity

This section examines whether the impact of the CSRD implementation on audit fees is more pronounced for firms operating within environmentally sensitive industries. Theoretically grounded in the Audit Risk Model, it's hypothesized that auditors would demand higher risk premiums and invest greater substantive effort into verifying the complex non-financial disclosures of highly exposed sectors. However, the DDD estimation in Model (3) reveals that the coefficient for the crucial interaction term, *Treat* × *Post* × *Env_sensitive*, is positive but statistically insignificant. This indicates that during the initial phase of the directive, industry-specific environmental sensitivity doesn't act as a distinct differentiator in audit fee adjustments.

A compelling explanation for the statistical insignificance of H3 relates to the institutional behavior of audit firms during the inception of high-stakes regulatory shifts. The implementation of the CSRD increases complexity through the European Sustainability Reporting Standards (ESRS) and mandatory limited assurance. As empirically documented in qualitative studies by Shevchenko and Jakobsson (2025), the audit profession has had to undergo rapid capacity building, internal restructuring, and substantial learning curve adjustments to cope with the novel mandate.

In the first few years of such a structural break, auditing firms face systemic start-up costs and elevated legal liability that apply broadly across all regulated entities. Consequently, rather than executing highly granular, sector-specific risk adjustments, auditors may implement a standardized, one-size-fits-all compliance premium. This pricing strategy serves to hedge against the uncertainty of the new regulatory regime and cover the audit firms' own infrastructure investments. Under this mechanism, the baseline increase in audit pricing affects all treated firms relatively uniformly, thereby diluting the measurable cross-sectional variation across sensitive and non-sensitive industries.

8.4 The Moderating Effect of ESG Performance

The results provide partial support for the moderating role of ESG performance. While the aggregate ESG score is not statistically significant, the Environmental and Social pillar scores show significant negative moderating effects. Specifically, the triple interaction term for the E pillar yields a negative coefficient of –0.016 and it's highly significant at the 1% level. Similarly, the social interaction term presents a negative coefficient of –0.015, achieving significance at the 5% level.

When viewed through Simunic's (1980) Audit Pricing Framework, audit fees are fundamentally a joint product of the auditor's resource consumption (effort) and a premium for expected future liability. The introduction of mandatory limited assurance under the CSRD introduces an abrupt escalation in both dimensions. However, for firms that have

proactively developed superior environmental and social accounting infrastructures — often called “ESG maturity” by Rakipi et al. (2024) — the initial compliance shock is substantially minimized.

Applying the Audit Risk Model (ARM) to this setting, pre-existing E and S scores serve as critical indicators of lower Inherent Risk and Control Risk. Firms with high environmental scores likely possess pre-established, verified tracking mechanisms for Scope 1, 2, and 3 emissions, resource extraction, and climate exposures. When auditors perform the required double-materiality assessments and verify compliance with the rigid ESRS, they can place a higher reliance on the client’s pre-existing internal control environments. According to the foundational logic of the ARM, this systemic reliance decreases the necessary volume and intensity of labor-intensive substantive testing required to control Detection Risk. Consequently, the auditor’s marginal time allocation is reduced, translating into a significantly lower audit fee premium.

From the perspective of Signaling Theory, superior E and S metrics represent credible, costly signals of organizational quality and operational transparency. In a regulatory climate marked by intense anti-greenwashing enforcement, auditors face heightened reputational and litigation risks when certifying sustainability statements. High-performing E and S firms signal to the audit market that their non-financial reporting is structurally sound, thereby minimizing the auditor’s subjective risk premium. This is particularly salient for the environmental pillar given the extreme technical complexity of climate assurance frameworks like ESRS E1. Firms that engaged in anticipation efforts (Fiechter et al., 2022) prior to the mandatory deadlines effectively minimized their compliance gap, yielding quantifiable financial returns via minimized professional fees.

In contrast to the environmental and social pillars, the triple interaction term for the Governance pillar in Model (4.3) exhibits a coefficient of –0.004 and lacks statistical significance. The absence of a moderating effect for corporate governance can be explained by the concept of institutional maturity. Long before the adoption of the CSRD, publicly listed entities across the European Union were already bound by rigorous, highly standardized corporate governance codes, board composition mandates, and strict internal financial auditing requirements. Consequently, when the CSRD introduced its sustainability assurance mandates, the marginal governance shock was relatively negligible. Because pre-existing governance scores capture institutional structures that were already baseline expectations for auditors, they provide no incremental informational advantage or marginal risk reduction during the transition to mandatory sustainability reporting.

This dimension-specific variance directly explains why the Aggregate ESG score model, Model (4), fails to yield a significant coefficient (–0.011, $p > 0.10$). When the cost-mitigating properties of the E and S pillars are statistically bundled with the large, non-significant variance of the G pillar, a possible dilution effect occurs. The aggregate index obscures the true underlying economic mechanism, incorrectly implying that sustainability performance as a whole does not matter for audit pricing. This statistical reality highlights the empirical

superiority of the disaggregated modeling strategy employed in this thesis, demonstrating that auditors evaluate and price specific non-financial operational controls independently rather than relying on generalized ESG ratings.

9. Conclusion

This thesis employs a difference-in-differences research design to investigate if the existence of mandatory sustainability reporting and assurance requirements of CSRD results in higher audit fees, whether these effects are also present for listed SMEs, and whether the fee increase is moderated by industry environmental sensitivity and firms' pre-existing ESG performance. Overall, the results show that the CSRD has created an audit pricing effect, confirming that sustainability regulation impacts not only corporate disclosure practices, but also the economic relationship between firms and their auditors.

The baseline results lend support to the main hypothesis. Audit fees of firms subject to the CSRD increased significantly after implementation relative to non-mandated firms. This result is consistent with Simunic's audit pricing framework (1980) and audit risk theory (Houston et al., 1999), as the CSRD increases the scope, complexity and risk of audit engagements (Freeman, 1984; Jensen & Meckling, 1976). Auditors will have to look at wider sustainability-related information, test less mature non-financial data systems and may need to engage sustainability or technical specialists. Hence, the increase in audit fees can be interpreted as a reaction to higher audit effort, higher engagement risk and higher verification requirements.

The study does not find strong evidence of spillover effects on listed SMEs. The results suggest that listed SMEs did not experience a significantly different post-CSRD audit fee change relative to the reference group and further indicate that the audit fee effect is mainly concentrated among directly mandated large firms. A possible explanation is that spillover pressures may take longer to appear, especially for firms without prior mandatory sustainability reporting experience (Kosi and Relard, 2024). In addition, the EU value-chain cap may reduce the extent to which CSRD-related reporting pressure is transmitted from large firms to SMEs (European Commission, 2025). Thus, while CSRD may create broader market expectations, the evidence for SME spillover effects remains limited in the current sample period.

The results also do not support the prediction that the environmentally sensitive industries have significantly larger increases in audit fees than non-sensitive industries. The estimated coefficient is positive but not statistically significant. One possible explanation is that during the initial implementation phase, auditors apply a broad compliance premium to all affected firms rather than highly differentiated sector-specific pricing. Uncertainty about the implementation of ESRS and limited assurance may have created general start-up costs for audit firms, reducing the observable differences across industries.

Finally, the analysis provides some support for the moderating role of ESG performance. The aggregate ESG score does not significantly moderate the fee increase related to CSRD, but the Environmental and Social pillars significantly negatively moderate the fee increase. This means that companies that are better at reporting on environmental and social matters might be related to lower additional audit costs because they are more likely to have better data collection systems, internal controls, and sustainability governance processes. The Governance pillar, however, does not show a significant effect, perhaps because governance practices are already relatively standardised among listed European firms.

Our study adds to the literature by offering early empirical evidence on the audit pricing consequences of the CSRD. The findings show that sustainability regulation can generate measurable audit cost implications, especially for directly mandated large firms. They also suggest that certain ESG data infrastructure may have economic value by reducing additional assurance costs under mandatory reporting regimes. For managers, the results highlight the importance of investing in reliable sustainability reporting systems and internal controls. For auditors, the findings point to the growing need for sustainability assurance expertise and capacity. For regulators, the results suggest that the direct audit fee burden is currently concentrated among mandated large firms, while potential indirect effects on smaller listed firms should continue to be monitored as CSRD implementation develops.

Because the CSRD is still in its early stages of implementation, and audit pricing effects may evolve as firms and auditors gain more experience, the findings should be interpreted with caution and further empirical evidence is needed. Furthermore, the H2 design is based on micro-undertakings as the reference group, which is relatively small and structurally different from listed SMEs and large firms. The CSRD exposure measure may not fully capture the real differences in compliance intensity between firms and countries, while ESG scores may be affected by incomplete coverage and inconsistency in ratings.

Future research can improve the analysis with more comparable control groups, direct data on exposure to supply chains, and institutional variables at the country level. It could also apply more granular measures of sustainability reporting maturity such as prior voluntary assurance, GRI or TCFD adoption and internal ESG control quality.

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Appendices:

Appendix A. Sargan-Hansen specification test.

	Coef.
Chi-square test value	18
P-value	0.000

Appendix B. Variance inflation factor.

	VIF	1/VIF
Assets (log)	1.564	.639
Leverage	1.254	.797
ROA	1.675	.597
Loss	1.599	.626
REC	1.201	.832
INV	1.058	.945
Big4	1.313	.762
Opinion	1.096	.912
CR	1.232	.812
Mean VIF		1.588

Appendix C. PSM-DID sample distribution.

	N (Observations)	**%**	**N (Firms)**	**%**
Treatment	467	21.2%	97	19.7%
Control	1,734	78.8%	395	80.3%
Total	**2,201**	**100.00%**	**492**	**100%**

Note: The table reports the distribution of the matched sample used in the PSM-DID regression. *Treatment* are firms classified as directly mandated large undertakings. *Control* are matched by non-treated firms. The firm-year observations reflect the regression sample after requiring non-missing variables.

Appendix D. Robustness check with PSM-DID, PSM sample (Full results).

	(1) PSM-DID POLS	(2) PSM-DID FE
Treat	-.229**	
	(.106)	
Post	.281***	.305***
	(.085)	(.06)
Treat × Post	**.219****	**.161*****
	(.095)	**(.057)**
Assets (log)	.595***	.471***
	(.035)	(.04)
Leverage	.205	-.005
	(.154)	(.107)
ROA	-.013***	-.006***
	(.002)	(.002)
LOSS	.149**	.019
	(.059)	(.036)
REC	.788**	.15
	(.311)	(.23)
INV	-.352	.152
	(.224)	(.19)
Big4	.492***	.107**
	(.071)	(.05)
Opinion	-.01	-.013
	(.102)	(.051)
CR	-.007	-.017**
	(.01)	(.007)
Constant	4.736***	6.002***
	(.42)	(.426)
Observations	2201	2201
Adj. R^2	.516	.328
Method	POLS	FE
Year fixed effects	Yes	Yes
Firm fixed effects	No	Yes

Standard errors are in parentheses

**** p<.01, ** p<.05, * p<.1*

Appendix E: Parallel trend test (Full results).

	Parallel Trend
Treat × Year −6	.068
	(.059)
Treat × Year −5	.002
	(.05)
Treat × Year −4	-.043
	(.044)
Treat × Year −3	-.041
	(.041)
Treat × Year −2	-.063*
	(.034)
Treat × Year −1	-.029
	(.029)
Treat × Year +1	**.036**
	(.028)
Treat × Year +2	**.076**
	(.048)
Assets (log)	.524***
	(.025)
Leverage	-.057
	(.067)
ROA	-.005***
	(.001)
LOSS	.057***
	(.014)
REC	.13
	(.175)
INV	.226
	(.154)
Big4	.1***
	(.029)
Opinion	-.067**
	(.031)
CR	-.016***
	(.006)
Constant	5.968***
	(.342)
Observations	10772
Adj. R^2	.319
Method	FE
Year fixed effects	Yes
Firm fixed effects	Yes

Standard errors are in parentheses
**** p<.01, ** p<.05, * p<.1*

Appendix F. Placebo test result (Full results).

	Placebo test
Post	.085***
	(.032)
Treat × Post	**.035**
	(.029)
Assets (log)	.531***
	(.03)
Leverage	-.146*
	(.077)
ROA	-.006***
	(.001)
LOSS	.035**
	(.015)
REC	.086
	(.202)
INV	.237
	(.167)
Big4	.119***
	(.034)
Opinion	-.058
	(.04)
CR	-.013**
	(.006)
Constant	5.943***
	(.396)
Observations	8446
Adj. R^2	.251
Method	FE
Year fixed effects	Yes
Firm fixed effects	Yes

Standard errors are in parentheses
**** p<.01, ** p<.05, * p<.1*

AI Contribution Statement

Generative AI tools such as Gemini and Claude were employed during the final drafting phase for structural suggestion, grammatical error detection, and language enhancement. AI was also utilized as a technical assistant to optimize and detect errors in econometric code for Stata.

AI tools were not used to conceptualize the underlying economic problems, formulate the baseline research questions, or develop the theoretical hypothesis. The interpretation of the empirical findings, the theoretical linking to existing literature are the original intellectual work of the authors.