

Tax Disclosures in Sustainability Reporting: Evidence on Disclosure Content and Corporate Tax Avoidance

INGA HARDECK,^{*} FRANK HECHTNER,[†] ANDREAS SEEBECK,[‡] AND
MARIUS WEIß[†]

Institutional affiliations: ^{*}University of Duisburg-Essen, Duisburg 47057, Germany; [†]Friedrich-Alexander-Universität Erlangen-Nürnberg, Nürnberg 90403, Germany; [‡]Constructor University Bremen, Bremen 28759, Germany

Correspondence: Inga Hardeck; Lotharstr. 65, LB 225, 47057 Duisburg, Germany; E-Mail: inga.hardeck@uni-due.de

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ABSTRACT

Global Reporting Initiative (GRI) 207, the first tax-focused sustainability reporting standard, requires GRI-reporting firms to provide detailed qualitative and quantitative tax disclosures when taxes are material. In this study, we exploit firms' adoption of GRI 207 to examine how tax disclosures embedded in sustainability reporting evolve and how they are related to corporate tax behavior. We are the first to use a combination of automated and manual textual analysis approaches, including the domain-specific large language model (LLM) *TaxBERT*, to study disclosure content and the characteristics of tax sustainability disclosures. We find that firms implement new tax strategies and revise their tax compliance management systems following GRI 207 adoption. In a second step, using a difference-in-differences design, we document a persistent 1–2 percentage point increase in GAAP effective tax rates (GAAP ETRs) among adopting firms. Disclosures on changes in tax strategies and risk mitigation efforts are particularly associated with higher GAAP ETRs. The results hold through multiple robustness tests addressing endogeneity, including a stacked cohort design. Our findings have policy implications, suggesting that corporate tax avoidance can be discouraged by integrating tax disclosure requirements into sustainability reporting frameworks.

I. INTRODUCTION

Corporate income taxes are an important source of public tax revenues and a key mechanism through which firms contribute to the economies of the countries in which they operate. Reflecting this, policymakers around the globe frequently highlight that corporate tax payments are crucial for achieving sustainability goals (UNDP [2010], UN [2015], OECD [2016], EC [2019]). However, recent research has shown that sustainability reports, which serve as firms' primary tool for communicating their sustainability efforts, often omit or lack meaningful tax-related information (Davis, Piger, and Sedor [2012], Hardeck, Inger, Moore, and Schneider [2024], Chaim and Parchomovsky [2024]). Against this background, the Global Sustainability Standards Board (GSSB) introduced the Global Reporting Initiative (GRI) 207 Tax—the first dedicated standard for tax-related sustainability reporting—as part of the broader Global Reporting Initiative (GRI) framework.¹

A key objective of introducing a dedicated tax standard (i.e., GRI 207) within the GRI reporting framework is to enhance tax transparency and encourage socially responsible tax behavior. This integration is intended not only to align tax disclosure requirements with environmental, social, and governance (ESG) priorities but also to foster cross-functional communication within firms to ensure that reporting across individual substandards is coordinated and consistent. As a result, tax-related topics are likely to receive greater awareness beyond the tax department, increasing internal scrutiny of tax practices across sustainability, legal, and executive teams.

GRI 207 focuses mainly on qualitative tax disclosures, including descriptions of the approach to taxes, tax governance, control and risk management, stakeholder engagement and

¹ The GRI standards are the most dominant global guidelines for sustainability reporting. In 2022, 78 percent of the 250 largest firms in the world reported according to these standards, with Europe, North America, and Asia leading in GRI 207 adoption rates (KPMG [2022], GRI [2024]). As of June 30, 2022, 68 percent of the 100 largest European firms by revenue had adopted the GRI standards for sustainability reporting (KPMG [2022]).

the management of concerns related to taxes.² Together, these elements can provide a contextual and holistic view of a firm's tax strategy and thus may provide insights into the intentions and reasoning behind tax decisions. Whereas the qualitative reporting elements are the dominant component of GRI 207, the standard also requires quantitative public country-by-country reporting (CbCR). However, firms often rely on the omission clause of the GRI to withhold CbCR, typically for reasons such as confidentiality or competitive sensitivity, legal constraints or data not being available or incomplete.

The goal of our study is twofold. First, we shed light on the content and characteristics of GRI reports and trends in their use over the period 2019–2023. Second, we examine whether tax sustainability disclosures embedded within the GRI reporting framework are associated with corporate tax avoidance by analyzing both the content and textual characteristics of GRI 207 disclosures as well as their relationship to firms' tax avoidance behavior. Our sample includes only GRI-reporting firms in the 27 EU member states, allowing us to systematically observe the consequences of tax sustainability disclosures within a regulatorily homogenous but still economically heterogeneous setting.³ The final sample consists of 538 GRI-reporting firms, of which 240 adopted GRI 207 during the sample period, while the remaining 298 firms serve as a control group.

We deliberately exclude non-GRI reporters to ensure that all the firms in our sample are subject to GRI 207, provided that their materiality assessment identifies taxes as a material topic.⁴ To remain compliant with the GRI standards, these GRI reporters must adopt GRI 207. In principle, firms could escape the newly introduced substandard by switching to another

² See Appendix B for examples of GRI 207 disclosures.

³ We exclude financial and extractive firms because they face specific tax-related disclosure obligations.

⁴ The materiality assessment is specified by the GRI 103 standard, according to which taxes are material if the firm's tax payments have significant impacts on the economy, environment, or society. The standard recommends conducting a materiality assessment every two to three years.

accepted, albeit less common, sustainability reporting framework. However, such behavior is likely discouraged by high switching costs, including wasted investments in GRI-based sustainability reporting infrastructure, along with potential disruptions in stakeholder communication and reputational risks, given the broad acceptance of GRI standards. As a result, although the decision to report under the GRI framework was initially voluntary, this prior choice does not affect the requirement for GRI-reporting firms to adopt GRI 207 if the tax is deemed material. Please note that auditors need to review the materiality assessment, which reduces endogeneity concerns.⁵

Our first research objective, which is to identify the contents and characteristics of the disclosures in GRI 207 reports, is descriptive in nature. Nevertheless, our analysis provides the first evidence on a previously unexplored aspect of corporate sustainability disclosures: structured tax sustainability reporting. We assess the content and textual characteristics of GRI 207 disclosures using a combination of automated and manual textual analysis approaches, including the domain-specific large language model (LLM) *TaxBERT* (Hechtner, Schmidt, Seebeck, and Weiβ [2025]), Latent Dirichlet Allocation (LDA)-based content analysis, and manual disclosure reviews.⁶ Our textual analysis indicates that the adoption of GRI 207 appears to prompt firms to take significant actions, including the implementation of new tax strategies and the revision of tax compliance management systems.

Building on these findings, our second research objective is to examine whether the adoption of GRI 207 by European firms is associated with a reduction in tax avoidance and which disclosure elements and characteristics are linked to this change. Ex ante, it is unclear whether

⁵ We refer to that point below.

⁶ *TaxBERT* is a domain-specific LLM developed and pretrained to analyze qualitative corporate tax disclosures. It builds on the *BERT* architecture and is fine-tuned on tax-related disclosures to enhance classification and interpretation of tax-relevant language in corporate reporting (Hechtner et al. [2025]).

GRI-reporting firms decrease their engagement in tax avoidance in response to the adoption of GRI 207.

On the one hand, firms' adoption of GRI 207 may foster *internal awareness* and scrutiny of the firms' tax practices across departments and lead to improved tax governance. GRI reporting typically involves multiple internal stakeholders, including sustainability or CSR departments, finance, legal and compliance units, and senior executives such as the CEO or CFO. This cross-functional involvement has the potential to put into question existing tax-related approaches and structures that may have previously enabled tax avoidance. As tax issues are integrated into broader sustainability reporting and subject to oversight from nontax specialists and top executives, firms may shift toward more transparent and responsible tax behavior. This reasoning is in line with that of the GSSB [2025], emphasizing that "through [GRI] reporting, an organization can understand and better manage its impacts on people and the planet."

Moreover, GRI 207 disclosures have the potential to increase *public scrutiny* through greater tax transparency. As GRI standards are not limited to specific industries or countries and explicitly aim at addressing the information needs of a wide range of stakeholder groups, they are likely to attract public attention and media coverage. Prominent examples are the shareholder resolutions filed against Amazon, Cisco Systems, and Microsoft in 2022, which explicitly called for tax transparency in line with GRI 207 standards (Ama Sarfo [2022a, b]). Public scrutiny increases firms' exposure to reputational risks. In line with the Scholes and Wolfson Framework [1992], which suggests that effective tax planning considers all taxes, all parties, and all costs, an increase in tax transparency through GRI 207 disclosures alters internal and external stakeholders' awareness and pressure and, thus, the benefits and costs of tax planning for firms (Joshi [2020], Shevlin and Venkat [2020]). Specifically, greater transparency results in more public scrutiny and potential reputational costs (Hasegawa,

Hoopes, Ishida, and Slemrod [2013], Hope, Ma, and Thomas [2013], Dyreng, Hoopes, and Wilde [2016], Hoopes, Robinson, and Slemrod [2018]).

On the other hand, from a managerial perspective, taxes represent a cost to the firm, and reducing tax payments within legal boundaries is often seen as a fiduciary responsibility to shareholders (e.g., Hanlon and Heitzman [2010], Phillips [2003]). As such, firms may be resistant to changing tax behavior, even when they adopt greater transparency. Moreover, despite the cross-functional design of GRI reporting, tax topics may remain siloed within organizations and be managed separately from other sustainability initiatives because of their highly specialized, complex, and technical nature. Finally, the results of prior research on the impact of tax transparency on tax avoidance are mixed. Most studies focus on the quantitative disclosure setting (Kerr [2019], Dyreng et al. [2016]), especially CbCR (Joshi [2020], Joshi, Outslay, and Persson [2020], Overesch and Wolff [2021], Rauter [2020]). Notably, Xia [2025] and Bilicka, Casi, Seregni, and Stage [2025], who examine the adoption of *qualitative* UK tax strategy reports, find no effect on tax avoidance.

Using a difference-in-differences design (DiD) including year and firm fixed effects, we find support for our prediction that a firm's adoption of GRI 207 is associated with reduced tax avoidance, as reflected in higher GAAP effective tax rates (*GAAP ETRs*). On the basis of stacked regression analyses, we observe that the effect materializes with a one-year lag and persists throughout the post-adoption period. Specifically, *GAAP ETRs* are 1–2 percentage points higher for adopting firms than for control firms.⁷ This translates into an average absolute income tax increase of EUR 1.8 million per firm. To put this increase into perspective, it corresponds to 0.6 percent of the average firm's annual sustainability expenses or 0.05 percent

⁷ This delayed response is in line with the results of prior research on the impact of regulatory changes on tax behavior (e.g., Kim, McGuire, Savoy, and Wilson [2019], Khan, Srinivasan, Tan [2017]) and the results of prior CSR literature (Fiechter, Hitz, and Lehmann [2022]).

of the average firm's revenue. This finding is interesting because, unlike Bilicka et al. [2025], who show that qualitative tax disclosure requirements in the UK led firms to signal compliance without real behavioral change, our results suggest that embedding tax disclosures within a broader sustainability reporting framework may create stronger incentives for firms to genuinely reduce tax avoidance. One explanation may be that compared with the UK requirements, which have been often criticized as sticky and boilerplate, internal awareness combined with increased public scrutiny led to these behavioral changes. In additional tests, we find that, in particular, disclosures on changes in tax strategies and risk mitigation efforts are negatively associated with tax avoidance.

One major concern in our study design is endogeneity. Low tax avoiders might self-select into GRI 207 reporting by claiming their taxes as material, whereas high tax avoiders do the opposite. However, this would require firms to assert that taxes are not material, even when they arguably are. Auditors play a crucial role in ensuring that the materiality assessment required by the GRI standards is conducted appropriately. Within the scope of predominantly limited assurance engagements, they conduct a comprehensive risk assessment to understand the firm's stakeholder dialog and materiality environment. On the basis of this assessment, they provide assurance on both the appropriateness of the reporting criteria used in GRI reporting and the content of the disclosures. Consequently, the GRI reporters in our sample face limited room to strategically avoid adopting GRI 207 if taxes are indeed material. Moreover, this external assurance reduces the risk of greenwashing by increasing the credibility of the disclosed tax information.

Nevertheless, we employ multiple efforts to mitigate endogeneity concerns. First, given the staggered adoption of GRI 207, we employ a stacked cohort design as an additional test to examine pre-event trends. In addition, we use entropy balancing to ensure that the parallel trends assumption is plausible by making the pretreatment characteristics of the treatment and

control groups more comparable. We do not find preevent trends. Second, in additional robustness checks, we redefine our control group by replacing GRI-reporting firms that have not adopted GRI 207 with Stoxx Europe 600 firms that do not publish any GRI reports. This latter group is not directly affected by either general GRI reporting or the specific implementation of GRI 207. Thus, by comparing treated firms to this group, we further reduce concerns that our findings are driven by the self-selection of inherently low tax-avoidance firms into GRI 207 adoption. Our results remain consistent and support the interpretation that the adoption of GRI 207 decreases tax avoidance and not vice versa. Third, in addition to these methodological efforts, we conduct several interviews with tax consultants and heads of tax departments from multinational firms.⁸ Our interviewees emphasized that materiality assessments—specifically the determination of whether tax is a material topic under GRI standards—are typically conducted as part of a firm-wide, cross-functional GRI reporting process. Moreover, they stressed that leaving the GRI framework to avoid tax-related reporting under GRI 207 was not viewed as a viable option primarily because, among other factors, the reputational and structural costs such a move would entail.

Overall, we infer from our results that the adoption of GRI 207 induces a strategic shift in firms' tax strategies toward less engagement in tax avoidance. Our study contributes to two streams of literature. First, we respond to the call by Dyring and Maydew [2018] for more research on how firms' public tax reporting affects their tax behavior. We provide initial empirical evidence that embedding tax disclosure requirements into sustainability reporting frameworks can discourage corporate tax avoidance.

Second, we add to the emerging literature that uses innovative natural language processing tools and ML applications to analyze qualitative tax disclosure and tax-related texts, a rapidly

⁸ We talked to 7 heads of tax from German multinational listed firms.

developing area that, to date, is represented primarily by working papers (e.g., Belnap, Thornock, Standridge, and Williams [2024], Jennings, Lee, and Towery [2020]). To our knowledge, we are the first to use a comprehensive set of textual analysis tools, including Naïve Bayes, LDA, and TaxBERT, to measure the disclosure characteristics of tax sustainability reports. Therefore, we embrace textual analysis as an emerging methodology in tax research and add evidence to the prior mixed findings on the effect of transparency on tax avoidance.

Our findings have policy implications, as they can inform regulators and standard setters in the development and refinement of both tax and sustainability disclosure standards. Specifically, the results imply that regulatory efforts to integrate tax disclosure requirements into broader sustainability reporting frameworks can serve as an effective instrument to discourage corporate tax avoidance. In addition to increasing *public* scrutiny through enhanced tax transparency, such an integrated approach may increase *internal* awareness and scrutiny of tax practices through the involvement of multiple departments in the reporting process. This broader internal engagement can prompt firms to reassess existing tax structures and align them more closely with their stated sustainability objectives. This may help explain why prior studies on UK tax strategy reports (e.g., Bilicka et al. [2025]), which are less integrated and cross-functional, do not observe similar effects. More broadly, we provide empirical evidence that sustainability disclosure mandates can promote desirable behavior and thus add to an understudied area in the literature (Christensen, Hail, and Leuz [2021]).

II. INSTITUTIONAL BACKGROUND

The GRI was founded in 1997. Over the years, it has become the global leader in sustainability reporting. Its primary objective is to provide all potential stakeholder groups with transparent and comprehensive information on how a firm's operating activities and strategic deliberations affect the economy, environment, society, and human rights (GSSB [2021]). To this end, GRI reports convey information on a firm's positive and negative contributions to

sustainable development. In addition, the GRI provides stakeholders with information on sustainability matters that are material for understanding the firm's financial position, development, performance, and value. The GRI framework comprises more than 30 interconnected standards, which are organized into universal, sector, and topic-specific standards, offering a comprehensive and structured approach that enables firms to report consistently on material sustainability topics across diverse areas of impact.

According to GRI 3, firms only need to report on topics deemed material.⁹ A topic is considered material if it reflects the firm's significant economic, environmental, or social impacts. To identify such impacts, firms must assess how their activities contribute or could contribute to sustainable development. In this context, GRI 3, Step 2 (p. 11) explicitly mentions tax payments as a relevant activity to be considered in the materiality assessment.

GRI 207 was implemented in December 2019 and became effective for GRI reports published after January 1, 2021. However, GSSB encouraged firms to opt for early application (GSSB [2019]). During the development of the GRI 207 Tax, stakeholders had the opportunity to comment on the exposure as part of a 90-day public comment period. The GRI received more than 80 comments from 110 organizations and individuals (GRI [2022]), which illustrates the high public relevance of tax as a sustainability issue from both a firm and stakeholder perspective.¹⁰

Prior to GRI 207, firms needed to disclose only minimal information on their payments to governments (EC1) and the subsidies received (EC4) under the GRI framework. The new much more comprehensive GRI 207 standard requires firms to disclose four elements: their approach

⁹ In 2021, GRI 3 replaced GRI 101: Foundation 2016. GRI 3 applies to reports or other documents published on or after 01.01.2023 and provides a step-by-step guide for organizations to identify material topics. The concept of "material topics" in GRI 3 still uses the criterion of the significance of the impacts as outlined in GRI 101.

¹⁰ By comparison, the GRI only received approximately 30 comments on the exposure draft of GRI 303 (Water and Effluents) and approximately 50 comments on GRI 306 (Waste). See Inger, Hardeck, Moore, and Hohlwegler [2025].

to tax (GRI 207-1), tax governance, control and risk management (GRI 207-2), stakeholder engagement and management of concerns related to tax (GRI 207-3), and public CbCR (GRI 207-4). Whereas GRI 207-1 to 207-3 are qualitative reporting disclosures, GRI 207-4 reporting is mostly quantitative. If a firm cannot report on any GRI disclosure for reasons such as confidentiality or competitive sensitivity, legal constraints or data being not available or incomplete, it can omit the disclosure, provided it offers a clear explanation (GRI 1: Foundation 2021, Requirement 6). In practice, this omission clause is most frequently invoked for public CbCR (GRI 207-4).¹¹ Moreover, in anticipation of the forthcoming EU public CbCR mandate, many firms have refrained from disclosing under GRI 207-4, choosing instead to align their reporting with the regulatory framework of EU CbCR once it becomes effective.

III. HYPOTHESIS DEVELOPMENT

Tax avoidance encompasses “all arrangements to reduce, eliminate or defer a tax liability” (Freedman [2004]). Research on the determinants and consequences of tax avoidance is widespread (see Hanlon and Heitzman [2010], Wilde and Wilson [2018], and Jacob [2022] for literature overviews). In particular, the number of studies on the effects of quantitative tax disclosures on tax avoidance has increased (e.g., Hope et al. [2013], Henry, Massel, and Towery [2016], Joshi et al. [2020], Overesch and Wolff [2021], Nessa et al. [2025]). However, the findings are mixed.

For example, studying the setting of the two recently introduced industry-specific public CbCR regulations for the banking sector and extractive industries in the EU, Joshi et al. [2020] find a decrease in income shifting between bank affiliates but fail to provide evidence of an overall reduction in tax avoidance. In contrast, Overesch and Wolff [2021] observe a curbing effect on tax avoidance. Similarly, Eberhartinger, Speitmann, and Sureth-Sloane [2025] find

¹¹ In our sample, 29 percent of firms make use of the omission clause for CbCR.

that banks reduce the number of subsidiaries in certain tax havens in response to the implementation of the CbCR. In contrast, Nessa et al. [2025] fail to find evidence of a change in U.S. MNEs' tax-motivated income shifting. Finally, for firms in extractive industries, CbCR is associated with significant decreases in firm value (Johannesen and Larsen [2016]).

Research on the effects of qualitative tax disclosure is limited. Both Xia [2023] and Bilicka et al. [2025] find no effect of adopting the UK Tax Strategy Report on tax avoidance. Bilicka et al. [2025] observe an increase in *voluntary* tax disclosures in annual reports due to the adoption of separate tax strategy reports in the UK. However, they also show that these disclosures tend to be sticky and boilerplate and thus are difficult for external stakeholders to verify. Bilicka et al. [2025] note that only consequently does the level of tax avoidance remain unchanged.

GRI 207 also constitutes mainly qualitative disclosure. However, we expect different outcomes in the EU under the GRI 207 framework because of two main mechanisms: First, increased *external* scrutiny resulting from greater use and acceptance of the GRI framework and its broader economic, environmental, and social scope, and second, enhanced *internal* awareness resulting from the cross-functional nature of GRI reporting.

First, from a stakeholder theory perspective, firms operate within a network of relationships with stakeholders such as investors, regulators, NGOs, and the public, whose perceptions and trust are important to long-term value creation (Freeman [1984]). These stakeholders rely heavily on firm disclosures. The implementation of GRI 207 constitutes a change to the disclosure environment by mandating increased tax transparency for GRI-reporting firms for which tax is a material topic. This heightened transparency exposes firms to greater public scrutiny, thereby increasing the potential costs of aggressive tax practices.¹² Once claims are

¹² Although a few firms may have already voluntarily disclosed their tax strategy before the implementation of GRI 207, the embedding in the GRI framework and in the GRI Content Index likely has increased public

made public in GRI 207 reports, firms face pressure to align actual behavior with their stated positions because the public can crosscheck claims in GRI 207 reports against observable behavior. Failing to do so may result in high reputational costs. Therefore, public scrutiny can increase reputational costs (Wilde and Wilson [2018]) and thus alter the benefits of tax planning strategies (Hasegawa et al. [2013], Joshi [2020]). This reasoning is in line with survey evidence suggesting that reputational concerns are a major aspect in shaping corporate tax strategies (Graham, Hanlon, Shevlin, and Shroff [2014]). Moreover, it aligns with the Scholes and Wolfson framework [1992], which posits that effective tax planning considers all taxes, all parties, and all costs. Consequently, tax transparency through GRI 207 can shift the cost–benefit calculus of tax planning (Joshi [2020], Shevlin and Venkat [2020]).

The second key mechanism underlying our expectation is that the standard is embedded in the wider GRI-reporting framework. Hence, GRI 207 reporting is the outcome of a cross-functional process that extends beyond the tax department and involves sustainability, legal, finance, and executive leadership. From an internal governance perspective, this integration increases oversight and reduces the likelihood that tax-related disclosure decisions are made in isolation. It also elevates the alignment of tax disclosures with broader GRI disclosures and corporate values and stakeholder commitments to a board-level concern. Organizational theories on information processing and control suggest that cross-functional collaboration reduces internal information asymmetry, limits the autonomy of individual departments, and strengthens compliance with ethical and strategic objectives (Galbraith [1973]).

These cross-functional processes can, for example, put past tax-related decisions under scrutiny, challenging existing structures or practices that may have previously gone mostly unquestioned within siloed tax and finance departments. The adoption of GRI 207 may prompt

attention through better dissemination of the information. In addition, the implementation of GRI 207 facilitates benchmarking between firms and thus, reduces information processing costs for stakeholders.

firms to reassess existing tax practices that are increasingly difficult to justify within a broader sustainability context. Such internal reevaluations can lead to behavioral adjustments aimed at aligning tax practices with the firm's sustainability narrative.

On the other hand, some important caveats regarding the effectiveness of GRI 207 in changing tax behavior must be acknowledged. First, despite the cross-functional design of GRI reporting, tax topics may remain siloed within organizations and be managed separately from other sustainability initiatives because of their highly specialized, complex, and technical nature. Second, while GRI 207 aims to support informed public debate and the development of socially desirable tax policy (GSSB [2019]), it remains unclear *ex ante* whether the adoption of the standard actually improves tax transparency. Specifically, whether GRI 207 reports are informative is questionable. GRI 207 reports can be used by firms to defend or obfuscate their current tax avoidance practices to "greenwash" their tax avoidance activities rather than enacting meaningful change (Inger et al. [2025], Bilicka et al. [2025]). Therefore, a detailed examination of the content and textual characteristics of GRI 207 disclosures is necessary in the first step to assess whether these reports provide meaningful insights or serve merely symbolic purposes. We focus not only on the substantive content but also on how the disclosures evolve over time. Third, the effectiveness of transparency hinges on the ability of stakeholders to process and act upon the disclosed information (Leuz and Verrecchia [2000]). Disclosure-based regulation imposes costs not only on firms but also on stakeholders, who face information processing burdens when complex or technical tax data are interpreted. As such, the potential for GRI 207 disclosures to trigger meaningful external scrutiny may be limited by resource constraints on the demand side.

Overall, we believe that more compelling reasons exist to believe that firms' adoption of GRI 207 could discourage future tax avoidance. To summarize, our research hypothesis is described as follows.

H1: Firms reduce their level of tax avoidance following the adoption of GRI 207.

IV. SAMPLE SELECTION AND DESCRIPTION

Sample Selection

We focus on GRI reports from EU-headquartered publicly listed nonfinancial and nonextractive firms for the 2019 to 2023 reporting period.¹³ In line with prior studies (e.g., Joshi [2020], Adams, Demers, and Klassen [2024]), we exclude financial institutions and firms in extractive industries on the basis of their Global Industry Classification Standard (GICS) codes, as these industries are subject to specific tax transparency regulations, such as additional public CbCR regulations. For our sample identification strategy, it is essential that GRI reports include the GRI Content Index (GRI 102-55), which specifies the location of all employed GRI standards. This index allows us to reliably identify whether and when a firm has adopted GRI 207. Reports that do not include a GRI Content Index were excluded from the sample. Table 1, Panel A summarizes the sample composition.

First, we web scrape the metadata of the Corporate Register report directory to construct our sample. The Corporate Register is the world's largest directory of sustainability reports and is frequently used in prior research (e.g., Adams et al. [2024], Clarkson, Li, Richardson, and Tsang [2019]). The main identifier in the Corporate Register is the firm name. For the 6,069 unique firms in the directory, we perform a fuzzy match¹⁴ against the names of publicly listed firms in the EU as recorded by Refinitiv. To ensure the accuracy of the matches, we manually verify each result.¹⁵ We omit delisted firms and those that publish non-English reports. This results in a final sample of 538 unique publicly listed, nonfinancial and nonextractive EU firms

¹³ We are not aware of any significant changes in tax legislation in one of the EU member states during the period of staggered adoption that could impact our results.

¹⁴ As a threshold for the fuzzy string match, we use a Levenshtein Distance of 50 percent.

¹⁵ For example, we inspect common abbreviations (e.g., BMW for “Bayerische Motoren Werke AG”) and abbreviations for legal forms.

that published at least one GRI report between 2019 and 2023. For these firms, we manually collect a total of 2,690 GRI reports.¹⁶

Next, we manually examine the GRI content indices of these 2,690 GRI reports. Among the 538 unique firms, 240 reported GRI 207 disclosures at least once during the sample period. In total, we identify 840 instances of GRI 207 disclosures. While some firms report their GRI 207 disclosures ($n=504$) in a standalone GRI or nonfinancial report, others include them in their annual or integrated reports ($n=336$). We then manually extract the GRI 207 disclosure texts and convert them into formats suitable for text mining. Finally, we collect financial data from Refinitiv for the financial years 2016 to 2023.¹⁷ Table 1, Panel A shows the sample selection steps for the main analysis, and Panel B reports the GRI 207 adoption rates by year.

- Insert Table 1 here -

Textual Characteristics of GRI 207 Disclosures

To address our first research objective, which is to identify the contents and characteristics of the disclosures in GRI 207 reports and trends in their use over time, we start by examining some textual characteristics of the 840 instances of GRI 207 disclosures across the years 2019–2023.¹⁸ Table 2, Panel C shows descriptive statistics. Appendix A contains detailed variable definitions, while Appendix D outlines the implementation of the text mining tasks and the construction of the corresponding measures.

- Insert Table 2 here -

Overall, we analyze 3,200 pages within GRI reports. The average length of the 207 GRI disclosures is 1,124 words (36.69 sentences). To put this into perspective, the text is significantly longer than UK Tax Strategy Reports containing 825 words (Bilicka et al. [2025]).

¹⁶ Overall, we download and inspect more than 3,500 documents. Some reports consisted of multiple documents.

¹⁷ We collect financial data for the preevent years 2016–2018 to calculate pretrends.

¹⁸ Data preprocessing includes the removal of punctuations, escape characters, new lines, and tab stops, as well as tokenization, case folding, stop word removal, stemming, and lemmatization.

Moreover, we observe an upward trend in the average length of disclosures, increasing from 1,122 words in 2019 to 1,193 words in 2023, which corresponds to approximately two to three sentences.

We classify the *risk sentiment* of each sentence in the GRI 207 disclosures into one of three categories: tax risk increasing, tax risk neutral, and tax risk mitigating. To this end, we leverage *TaxBERT*, a novel LLM specifically designed to analyze corporate qualitative tax disclosure (Hechtner et al. [2025]). The tax risk increasing category captures statements that indicate heightened exposure to tax uncertainty, such as potential disputes with tax authorities. The tax risk neutral category encompasses descriptive or factual information that conveys neither an explicit increase nor mitigation of tax risks. Finally, the tax risk mitigating category reflects disclosures that describe compliance, transparency, or strategies aimed at reducing tax-related risks.

We find that GRI 207 disclosures exhibit a markedly high proportion of risk-mitigating content. Specifically, on average, more than 14 sentences per GRI 207 report address concrete risk mitigation measures. These sentences include descriptions of internal tax governance structures and how tax risks are considered in business processes. Moreover, they cover the identification and management of tax risks, mechanisms for evaluating compliance, and procedures for raising concerns about tax-related integrity.

The level of *specificity* of GRI 207 disclosures is high. Specific words include firm names, persons, subsidiary locations, and numerical data and provide incremental information (Hope, Hu, and Lu [2016]). On average, firms use more than 10 percent of specific words, which corresponds to more than 100 specific words in their disclosures. Taken together, these findings suggest that GRI 207 disclosures provide incremental, potentially novel information to stakeholders by combining a relatively high degree of specificity with a clear focus on concrete risk-mitigation measures.

The observed mean *readability* as measured by the BOG index is 77.01, which implies that reports are fairly readable compared with findings from prior financial disclosure studies (e.g., for financial statements: Bonsall, Leone, Miller, and Rennekamp [2017]: 94.98 and Bonsall and Miller [2017]: 83.26; for expanded auditor reports: Seebeck and Kaya [2023]: 89.39).¹⁹ Hence, the texts are easier for readers to understand, which is in line with the GRI's goal of providing informative value to diverse stakeholder groups.

Afterward, we draw on a naïve Bayesian algorithm to calculate *tone* scores (Zhang and Li [2007], Li [2010]).²⁰ The resulting variable *NET_TONE* can range between -1 and +1, with positive (negative) values indicating an overall positive (negative) tone. The mean tone score is 0.08, suggesting that overall, firms tend to report positively about their tax approach. This value is slightly greater than the average tone of the overall GRI standard text, which is 0.06. In additional tests based on the Loughran McDonald Master Dictionary, we find that significantly more positively (i.e., mean: 18) than negatively connotated (i.e., mean: 15.2) words are used.

Next, we measure the *similarity* of disclosures to study the development of GRI 207 disclosure in the cross section. To this end, we use a specialized BERT model based on Siamese and triplet network structures. Specifically, we employ the Sentence Transformers model (SBERT) to calculate the similarities in the reporting of GRI 207 between a) the reports of different firms, b) a given report and the GRI 207 standard itself, and c) the reports of a given firm over time. Figure 1 provides initial graphical evidence of the similarities among the reports over the first two years after adoption. The greater the distance between the reports, the less

¹⁹ Note that higher values indicate lower readability.

²⁰ Machine learning requires substantial computational power, and Frankel, Jennings, and Lee [2022] show that this approach outperforms dictionary-based methods. Consequently, we expect tone scores from machine learning to better capture the polarity dimensions than can specialized financial dictionaries because such learning accounts for subtleties including negations and contextually different meanings (Bochkay, Brown, Leone, and Tucker [2023]).

similar the texts are. We find a mean similarity of 0.629 regarding the similarity between the reports of different firms, indicating relatively high consistency and thus comparability between the reports. We observe a slight upward trend in the average similarity of disclosures, increasing from 0.573 in 2019 to 0.624 in 2023. The mean textual similarity between the GRI 207 standard and firms' GRI disclosures is 0.623, suggesting that firms generally address the topics and items outlined in the standard. Notably, the mean similarity of the GRI 207 reporting of a given firm over time is 0.9268, indicating that once adopted, GRI disclosures by a given firm remain widely stable.

- *Insert Figure 1 here* -

Content of GRI 207 Disclosures

A detailed *manual* content analysis of GRI 207 reports reveals that at least 134 out of the 240 GRI 207-reporting firms adopted *new* tax initiatives or mechanisms in the year following their GRI 207 adoption.²¹ Specifically, 24 firms implemented a *new* tax strategy. One example is the Cellnex Group, SA [2021]:

“In July 2021, the Board of Directors of Cellnex Group, SA approved a new Tax Policy that reinforces and updates the Group's guiding principles in tax matters. [...] As a consequence [...], the presence in the territories where the Cellnex Group runs its activity responds to business reasons. Additionally, the Cellnex's tax policy prohibits operating in territories considered as tax havens under Spanish law or included in the "European Union's black list of non-cooperative tax jurisdictions" in order to evade tax obligations [...].”

Moreover, 20 firms implemented a *new* tax compliance management system, such as the Hamburger Hafen und Logistik AG [2023]:

“HHLA started implementing the TCMS [...]. For domestic companies receiving tax consultancy services, it was completed and audited in 2023. The system is expected to be fully integrated, including in the foreign subsidiaries, in 2024.”

²¹ Note that some firms adopted more than one tax initiative or mechanism.

Next, 73 firms made major changes to their *existing* tax strategy or tax compliance management system. In addition, 22 firms introduced *new* tax reporting mechanisms, and 11 firms, such as Obrascón Huarte Lain, S.A. [2023], provided additional employee training and sensitization:

“All employees must be aware of and accept the compliance policies. Awareness campaigns were carried out and training provided in 2023.”

Furthermore, 16 firms signed *new* agreements with tax authorities, and 21 obtained *certifications* for their tax compliance management systems or overall tax strategies after the implementation of GRI 207. These findings strongly suggest a strategic shift in tax strategies following the adoption of GRI 207.

Next, we conduct an *automated* Latent Dirichelet Allocation (*LDA*). LDA is an unsupervised machine learning technique that identifies latent thematic structures in a collection of documents. This approach enables researchers to uncover recurring patterns in textual data without prior labeling. Overall, we find that a model based on 20 topics and unigrams performs best.²² We determine the optimal interpretable number of topics by employing the perplexity score by Blei, Ng, and Jordan [2003], as well as the “word intrusion” task described in Dyer, Lang, and Stice-Lawrence [2017]. Furthermore, we use the coherence measure C_V introduced in Röder, Both, and Hinneburg [2015] to evaluate the semantic consistency and performance of the model. Following Dyer et al. [2017], we manually group each of the LDA topics into categories. To this end, two researchers independently evaluated the word lists and assessed the best fit using the top 10 words derived from the LDA. As categories, we focus on the disclosures required by the GRI 207 standard, in particular, tax strategy (*STRATEGY*), tax compliance (*COMPLIANCE*), tax risk management (*RISK_MAN*),

²² In untabulated robustness checks, we also rely on bigrams, trigrams, and four-grams. We find comparable results but with a significantly weaker model performance. The performance decreases with the number of words used in n-grams.

economic impact (*IMPACT*), and country-by-country reporting (*CBCR*). We also include a category for generic language (*GENERIC*). In the next step, we cumulate the topic loadings by category and document to construct a six-dimensional document vector. This vectorized representation allows us to integrate the thematic focus of the disclosures into multivariate analyses used in additional tests.

We present the results in Table 2, Panel D, which corroborate the findings from our manual content analyses. The graphical results of the analysis presented in Figure 2 reveal that there is little use of generic language (orange) or disclosures on economic impact (violet) in GRI 207 reports. Indeed, on average, more than 24 percent of GRI 207 disclosures deal with tax approach topics (green), while 38.1 percent focus on tax risk management (red). These findings indicate a strong alignment between the automated topic modeling approach and the manually derived content categories and results from *TaxBERT*, thereby validating the robustness of our results.

- *Insert Figure 2 here* -

Interim Conclusion

Overall, in response to our first research objective, we conclude that many firms use GRI 207 reports to communicate substantive changes in their tax practices, such as the implementation of new tax strategies and revisions to tax compliance management systems. Our results suggest that the adoption of GRI 207 may not merely be a symbolic exercise but is often accompanied by meaningful internal actions.

V. RESEARCH METHODOLOGY

To address our second research objective, which is to examine whether the adoption of GRI 207 by European firms is associated with a reduction in tax avoidance, we test our main research hypothesis by estimating the following DiD model.

$$TA_{i,t} = \beta_0 + \beta_1 GRI207_{i,t} + X_{i,t} + \gamma_i + \delta_t + \varepsilon_{i,t} \quad (1)$$

We regress the level of tax avoidance (*GAAP ETR*) of firm i in year t on the variable of interest *GRI207* and the control variables and firm (γ_i) and year (δ_t) fixed effects. *GRI207* is coded one if the GRI report covering year t by firm i includes GRI 207 disclosures and zero otherwise. If firms reduce their level of tax avoidance after adopting GRI 207, the coefficient β_1 should be significantly positive. To ensure that the groups of GRI 207 reporters and nonreporters are comparable across key covariates, we estimate all the models using entropy balancing (Hainmueller [2012]), thus strengthening the validity of our causal inferences.²³ We cluster standard errors at the firm level.

We use the *GAAP ETR*, defined as the annual book tax expense divided by pretax income, as the main proxy for tax avoidance (Hanlon and Heitzman [2010], Joshi [2020]).²⁴ In additional robustness checks, we employ the difference between a firm's *GAAP ETR* and the statutory tax rate (*STR*) of its country of headquarters, i.e., the tax differential (*TAX DIF*), as well as the yearly relative change in *GAAP ETRs* ($\Delta GAAP ETR$) (Hanlon and Heitzman [2010], Joshi [2020]). Consistent with the prior literature, we exclude loss observations and observations with negative income taxes from the regressions and reset ETRs to 0 and 1 to simplify the interpretation (Dyreng et al. [2016]).²⁵

We include several firm-level controls ($X_{i,t}$) from the prior literature on the effect of tax transparency on tax avoidance (e.g., Joshi [2020], Balakrishnan, Blouin, and Guay [2019]).

²³ We balance the covariates on the first (mean) and second (variance) moment and employ the default tolerance of 0.015 (Hainmueller and Xu [2013]). The results hold through multiple alternative balancing approaches.

²⁴ U.S.-based empirical studies often rely on taxes paid (i.e., cash ETR). However, cash taxes paid are often not available for European firms. In addition, a multiyear measure is required due to the poor matching of pretax income to taxes (Adams et al. [2024]). Given that the staggered adoption of GRI 207 started in 2019, this matching further significantly reduces the sample size. Therefore, we do not examine cash ETRs.

²⁵ Our results remain robust when including loss observations and observations with negative income taxes, and when not resetting *GAAP ETRs*.

These variables include return on assets (*ROA*), leverage (*LEV*), and R&D expenditure (*RD*). Furthermore, we include market capitalization to control for size effects (*SIZE*). Capital intensity (*CAPINT*) and investment intensity (*INVINT*) allow us to control for the asset mix (Gupta and Newberry [1997]). We further ensure that our results specifically isolate the effect of GRI 207 and do not merely reflect a general increasing trend in ETRs attributable to other existing or forthcoming EU regulations. To account for this, the dummy *REGULATION* is coded 1 if the firm is subject to private or public CbCR and to Pillar 2 regulations. Finally, we control for the statutory tax rate of the headquarters country (*STR*). All the continuous variables are winsorized at the 1st and 99th percentiles. Appendix A includes the descriptions and sources of all the variables used.

One concern regarding our findings is that they may be impacted by self-selection or firm-level, time-varying correlated omitted variables. Although we use a fixed effects model to mitigate the possibility of these biases, we cannot fully rule out that our results are influenced by unobservable factors. To significantly mitigate endogeneity concerns, we exploit a stacked DiD design. Under this design, any change in tax avoidance would need to happen in tandem with the adoption of GRI 207 of GRI-reporting firms in the 27 EU countries across a span of four years to confound our analyses.

In line with the previous literature (Clarke and Tapia-Schythe [2021], Schmidheiny and Siegloch [2019], Freyaldenhoven, Hansen, and Shapiro [2019], Athey and Imbens [2022]), we estimate the following equation for firm i and year t :

$$TA_{i,t} = \sum_{j=2}^3 (PRE\ j)_{i,t} + \sum_{k=0}^3 (POST\ k)_{i,t} + X_{i,t} + \gamma_i + \delta_t + \varepsilon_{i,t} \quad (2)$$

The coefficients for the dynamic *PRE* and *POST* periods capture the difference between GRI 207 reporters and nonreporters in the respective period relative to the prevailing difference

in the omitted baseline period.²⁶ No dummy for *PRE1* is included in the model, as it serves as a benchmark, while *POST0* denotes the year of adoption. As is common in prior studies (e.g., Clarke and Tapia-Schythe [2021], Rauter [2020], Bilicka et al. [2025]), pre-treatment and post-treatment periods are binned at the final endpoints. Figure 3 presents how we define and code dynamic *PRE* and *POST* periods.

- Insert Figure 3 here -

VI. EMPIRICAL RESULTS

Descriptive Statistics

In Table 2, Panels A and B, we present descriptive statistics of the tax avoidance measures and control variables used for the regression analysis. We also perform a series of *t* tests. For the *GAAP ETR*, the results do not indicate any statistically significant difference between the treatment and control group means ($t = -1.1928; p > 0.10$).²⁷ However, some notable differences between the groups emerge in terms of firm characteristics. Specifically, GRI 207 reporters tend to be significantly larger and exhibit higher leverage. Moreover, they spend less on research and development and have a lower inventory ratio than the control group does.

Pearson Correlations

Table 3 shows the results of the Pearson and Spearman correlations. We show the coefficients for *GAAP ETR* (i.e., the dependent variable) and all of the control variables used in the main analysis. The correlation coefficients of the control variables range from -0.2157 (between *GAAP ETR* and *ROA*) to 0.5372 (between *REGULATION* and *SIZE*), suggesting that there is no potential bias induced by multicollinearity. Additional checks for variance inflation

²⁶ For the terminology, we follow the definition by Clarke and Tapia-Schythe [2021].

²⁷ In further multiple logistic regression analyses, in which we use a dummy variable for GRI 207 reporting as the dependent variable, we find no statistically significant effect from *GAAP ETRs* on GRI adoption, implying that tax avoidance has no significant influence on the decision to adopt GRI 207 reporting. The (untabulated) results are robust to using different variations of the controls.

factors (VIFs)²⁸ do not indicate multicollinearity problems, as the maximum VIF count is 1.68. In addition, the results of the Ramsey test for omitted variables indicate that the models do not have omitted variable problems ($F = 26.99$; Prob $> F = 0.0000$).

- Insert Table 3 here -

Association between GRI 207 Disclosures and Tax Avoidance

We present the results of our DiD estimations in Table 4. We find that the level of tax avoidance significantly decreased relative to that of the control firms after adoption. The results in Columns (1) to (4) suggest that, on average, GRI 207 adopters increase their *GAAP ETR* by 1.3 to 2.0 percentage points, with this effect persisting across post-adoption periods. The magnitude of the coefficient appears to be an economically significant effect. The results are robust to adding industry and country fixed effects in Column (3) and yearly changes in the control variables (Column (4)).²⁹ They also continue to hold when *GAAP ETR* is replaced by the yearly relative change in *GAAP ETR* (Δ *GAAP ETR*), as shown in Column (5). Using this change model specification also helps us control for omitted variable bias arising from time-invariant unobserved heterogeneity. Next, following Joshi [2020], we replace *GAAP ETR* with *TAX DIF* as the dependent variable, as reported in Column (6). Consistent with our main analysis, we find a positive coefficient for *GRI207*. Overall, our results suggest that the adoption of GRI 207 is associated with real effects on a firm's tax avoidance strategy.

- Insert Table 4 here -

²⁸ VIF depends only on the explanatory variables in the model. We estimate the models based on an OLS regression design and then run tests for the variance inflation factor.

²⁹ In untabulated robustness checks, we control for the European Anti-Tax Avoidance Directive. We also reestimate our regression analyses based on a standard OLS model without fixed effects including the wild cluster bootstrap-based inference approach (Cameron, Gelbach, and Miller [2008], Roodman, Nielsen, MacKinnon, and Webb [2019]). Our results remain qualitatively unchanged.

Robustness and Additional Analyses

Next, we challenge our results to control for preevent trends and unobserved, time-varying factors that might influence both the adoption of GRI 207 and the level of tax avoidance.

Parallel trends assumption and stacked cohort design

We begin by examining temporal trends in *GAAP ETRs*. The issuance of firms' first GRI 207 reports is heterogeneous across the five financial years from 2019 to 2023. Using a stacked cohort design (Cengiz, Dube, Lindner, and Zipperer [2019], Baker, Larcker, and Wang [2022], Barrios [2022]), we find that the tax avoidance of GRI 207-adopting firms and that of firms not yet reporting are nearly identical in the pre-adoption years. Figure 4 shows that, prior to GRI 207 adoption, the differences in *GAAP ETRs* between the treatment and control groups are not statistically significant, thereby supporting the parallel trends assumption.³⁰

- *Insert Figure 4 here* -

Table 5 presents the results of the stacked DiD approach. Starting one year after adoption (*POSTI*), we document positive and significant coefficients in line with our research hypothesis, indicating that firms significantly increase their *GAAP ETRs* following GRI 207 adoption. This time lag is plausible, as many firms run their materiality assessments for GRI reporting when preparing their reports, which is typically at the end of the existing reporting period or the beginning of the subsequent one. Thus, firms have little or no time to change processes, structures, and systems to prepare for adoption. Moreover, a lag effect is in line with the findings of prior studies that examine the effects of regulatory changes on tax avoidance (e.g., Kim et al. [2019], Khan et al. [2017]). Owing to the rigidity of tax-related organizational structures and systems, the effects of new tax strategies are delayed.

- *Insert Table 5 here* -

³⁰ We do not find evidence that the COVID-19 pandemic materially affected the results of our analysis.

Notably, the similarity scores presented above in Figure 1 indicate that once adopted, GRI 207 disclosures by a given firm remain highly stable. These findings support the notion that the one-year-ahead reduction in tax avoidance after adopting GRI 207 is a delayed effect of the first-time adoption and does not stem from amended and specifically more informative reporting in the second year of GRI 207 reporting.

Importantly, the positive effect in Table 5 does not diminish after the initial adjustment but rather persists in subsequent periods (*POST2* and *POST3*), suggesting that the increase in GAAP ETRs represents a sustained change in firms' tax behavior rather than a temporary reaction to the adoption of GRI 207. Our results are robust to alternative model specifications and alternative estimation methods such as the staggered panel event study design (Clarke and Tapia-Schythe [2021]).³¹

While the results from the stacked DiD specification are directionally consistent with those of the two-way fixed effects model used in the main analysis, further supporting our main findings, the larger coefficient size likely reflects the narrower focus of this approach. Specifically, the stacked DiD concentrates on a subset of treated and control observations near the adoption event, emphasizing firm-years immediately surrounding treatment, where responses may be stronger, while omitting untreated periods further from the adoption window. As a result, it captures an average treatment effect around the time of adoption rather than an effect averaged across the full range of firm-years and treatment timings.³² In contrast, in our main analysis, we leverage the full panel of observations, providing a more comprehensive estimate of the overall association between GRI 207 adoption and corporate tax avoidance. Therefore, we consider the main DiD coefficient, ranging between 1.3 and 2 percentage points,

³¹ Results for the staggered panel event study design are untabulated.

³² Differences may arise from heterogeneity in treatment effects over time or variation in treatment timing across firms.

to be a more reliable estimate of the overall association between GRI 207 adoption and corporate tax avoidance.

Alternative Control Group – Stoxx Europe 600

In the main analysis, GRI-reporting firms that have not adopted GRI 207 serve as a control group for those that have. This can cause distortions, as the implementation of GRI 207 into the GRI framework can also affect some of the firms in the control group. For example, taxes could become a material topic in future materiality assessments for firms in the control group, thus indirectly impacting their tax strategy in previous periods. Specifically, the implementation of the standard may raise awareness about tax-related issues among all GRI reporters, even those not yet disclosing under GRI 207. As a result, firms in the control group might also adjust their tax strategies. Moreover, GRI 207 reporting by other firms could induce nonreporting firms' stakeholders to also require tax information. Consequently, non-GRI 207 reporters may also have incentives to adjust their tax strategies. We address this issue by using non-GRI reporting Stoxx Europe 600 firms as an alternative control group. These firms, similar to our treatment group, are large and listed but deemed not to be affected by the GRI 207 implementation, ensuring that the control group is a true counterfactual. Our results remain consistent, as shown in Table 6. We also find that the parallel trends assumption holds. That is, we do not find differences in the level of tax avoidance between GRI 207 reporters and Stoxx Europe 600 firms that did not publish GRI reports prior to the event.

- Insert Table 6 here -

In untabulated tests, we further do not observe statistically significant results when we compare European listed GRI-reporting firms with European listed firms that do not report according to the GRI standards. Overall, our findings indicate that the results are not driven by a biased control group, as they remain consistent when the non-GRI-reporting Stoxx Europe 600 firms are used as an alternative control group, with no evidence of pre-treatment

differences in tax avoidance and untabulated tests likewise showing no significant differences between GRI and non-GRI reporters.

Prediction of Income Tax Increases

The findings presented in Table 4 suggest an increase in *GAAP ETRs* of 1.3 to 2.0 percentage points for GRI 207 adopters. To assess the corresponding economic magnitude of this effect, we follow a model-based prediction approach grounded in our regression estimates. Specifically, we predict the effective tax rates for each firm under two hypothetical scenarios: first, assuming GRI 207 adoption (treatment), and second, assuming non-adoption (control), while holding all other covariates constant at observed values. The difference in predicted ETRs is then multiplied by the firm's actual pretax income to approximate the absolute tax burden attributable to GRI 207.

Figure 5 presents the observation-level distribution of income tax increases. On average, this corresponds to an absolute income tax increase of EUR 1.8 million per adopting firm and year. This effect size appears economically meaningful and reasonable considering the average income taxes of EUR 179 million and EUR 274 million for all EU-taxonomy eligible, sustainability-related capital expenditures (*CAPEX*) of the typical sample firm during the study period. The increase in taxes in response to the adoption of GRI 207 accounts for approximately 0.6 percentage points of GRI 207 reporting firms' CSR expenditures and thus is an economically meaningful element of firms' CSR activities. Moreover, the effect corresponds to only approximately 0.05 percent of average firm revenues.

- *Insert Figure 5 here* -

Interim Conclusion

Overall, in response to our second research objective and in line with our research hypothesis, we find consistent and robust evidence for an association between the firm's adoption of GRI 207 and the level of tax avoidance. Our findings suggest that incorporating

tax-related disclosures into sustainability reporting frameworks can play a role in discouraging corporate tax avoidance. Importantly, the stacked cohort design, use of Stoxx Europe 600 firms as an alternative control group, and change model specification used in the robustness checks alleviate reverse causality concerns. Taken together with the findings from both the automated and the manual textual analysis, our findings provide evidence that firms adopting GRI 207 are not only modifying their reporting practices but also adjusting their underlying tax strategies and risk mitigation efforts.

Association between GRI 207 Reporting Contents and Tax Avoidance

Next, we conduct additional tests to investigate the relationship between the *content* of GRI 207 disclosures and firms' tax avoidance practices. To this end, we incorporate the underlying six-dimensional vectors from the LDA analysis of GRI 207 reports into the DiD regression model to quantify how the specific aspects of tax-related reporting and practices affect firms' *GAAP ETRs* after adopting the GRI 207 standard. We report our results in Table 7.

- *Insert Table 7 here* -

The positive coefficients for *STRATEGY* suggest that adopting the GRI 207 standard is associated with changes in corporate tax strategies and tax compliance that are reflected in higher future *GAAP ETRs*. In particular, firms that disclose more extensive tax strategy information tend to exhibit higher *GAAP ETRs* in subsequent years. This suggests that strategy-related disclosures, especially those covered in GRI 207-1 and GRI 207-2, may encourage more responsible tax practices, such as better adherence to tax laws and regulations or a strategic shift toward less aggressive tax planning. Similar results apply for *Compliance* regarding the dependent variable Δ *GAAP ETR*.

In contrast, the quantitative data disclosed under GRI 207-4 (*CBCR*) appear to have limited explanatory power for observed changes in tax behavior. Similarly, statements regarding the societal impact of tax practices (*IMPACT*), which, according to the manual analysis, lack

substantive detail, seem to have little influence on tax avoidance. These findings highlight the role of GRI 207-1 and GRI 207-2 in shaping more sustainable corporate tax behaviors.

Association between GRI 207 Textual Disclosures Characteristics and Tax Avoidance

Table 8 presents the results from an analysis exploring how risk sentiment within firms' GRI 207 reports relates to tax avoidance behavior. Specifically, we include the following three tax risk-related dimensions as measured by *TaxBERT* (Hechtner et al. [2025]) in the regressions of the DiD model: tax risk increasing (*RISK*), tax risk neutral (*NEUTRAL*), and tax risk mitigating (*MITIGATION*) as well as increases in such measures and textual analysis-related controls.

- *Insert Table 8 here -*

Our findings indicate that both the presence of risk mitigation language (*MITIGATION*) and increases in such language (Δ *MITIGATION*) are significantly associated with subsequent reductions in tax avoidance, as shown in Columns (1)–(3) of Table 8. This suggests that firms emphasizing specific tax risk mitigation actions, initiatives, and strategies in their GRI 207 disclosures tend to adopt more responsible tax practices in the following years. In contrast, risk-neutral and risk-related language does not show any statistically significant association with tax behavior.

Notably, most other textual characteristics, including readability (*BOG*), specificity (*SPECIFICITY*), and similarity to the GRI 207 standard text (*SIMILARITY*), are not associated with tax avoidance. This is plausible, as these characteristics largely measure the structural and stylistic aspects of the disclosure rather than their substantive content or the underlying intentions. For instance, readability tells us how easy the disclosure is to understand but not whether it reveals aggressive or conservative tax practices. Notably, the lack of a significant association for *NET_TONE* supports the interpretation that firms are not merely engaging in greenwashing by using overly positive language to present their tax practices in a more favorable light within GRI 207 disclosures.

Overall, the results from including content and textual analysis measures in the regression analysis indicate that GRI 207 reports are informative and that firms do not seem to use GRI 207 reports merely for greenwashing. Disclosure on tax strategy and compliance drive the positive association documented in the main tests. The high intrafirm similarity observed in GRI 207 reports over time indicates no continuous increase in changes to tax strategies in subsequent years as the disclosure becomes sticky. These findings are in line with those in Figure 4, suggesting that *GAAP ETRs* stabilize at a 1–2 percentage points higher level in the post-GRI 207 phase than in the pre-GRI 207 phase.

VII. CONCLUSION

The GRI framework is the first sustainability reporting framework to formally integrate taxes. Combining manual analysis with automated machine learning and text mining techniques, we provide novel insights into the content and characteristics of tax sustainability disclosures under GRI 207. We show that firms often describe substantive changes in their tax strategies and improvements in their tax compliance management systems following the adoption of GRI 207. These findings suggest that GRI 207 reporting may not merely serve symbolic purposes but can reflect meaningful internal action in response to increased tax transparency requirements.

Next, we provide evidence of a negative association between the adoption of GRI 207 and tax avoidance behavior. Our results indicate that tax sustainability disclosures are associated with a persistent 1–2 percentage-point reduction in tax avoidance in subsequent years. The effects are statistically significant, robust to various model specifications, and economically meaningful compared to firms' overall ESG expenses.

This study has certain limitations. First, we provide only initial evidence for the short-term effects of public tax sustainability disclosure on corporate tax avoidance. Long-term evidence on the real effects or capital market consequences of public sustainable tax disclosure remains

an open question for future research.³³ Moreover, we acknowledge that the interpretation of “sustainable and responsible tax practices” is not explicitly defined in the GRI 207 guidance, and our study does not claim to offer a normative judgment of what such practices should entail. While we use higher *GAAP ETRs* as an observable proxy for reduced tax avoidance, we recognize that not all ETR-decreasing strategies are necessarily aggressive or inconsistent with sustainability goals. For example, investments in capital expenditures or nontaxable bonds may lower a firm’s *GAAP ETR* while still aligning with long-term responsible business conduct. Future research could explore how firms frame and justify tax strategies in narrative disclosures, using tools such as *TaxBERT*, to better capture the nuances of what constitutes “sustainable” tax behavior.

³³ A key challenge in studying capital market responses to GRI 207 adoption is that the issuance dates of GRI reports are often difficult to determine, making it challenging to define precise event windows for identifying market reactions.

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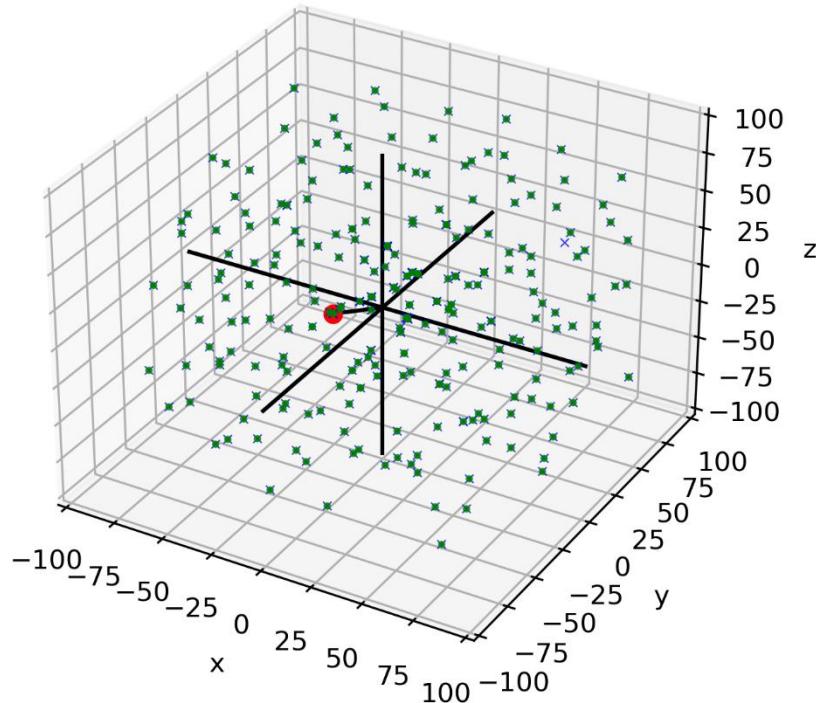
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FIGURES

FIGURE 1

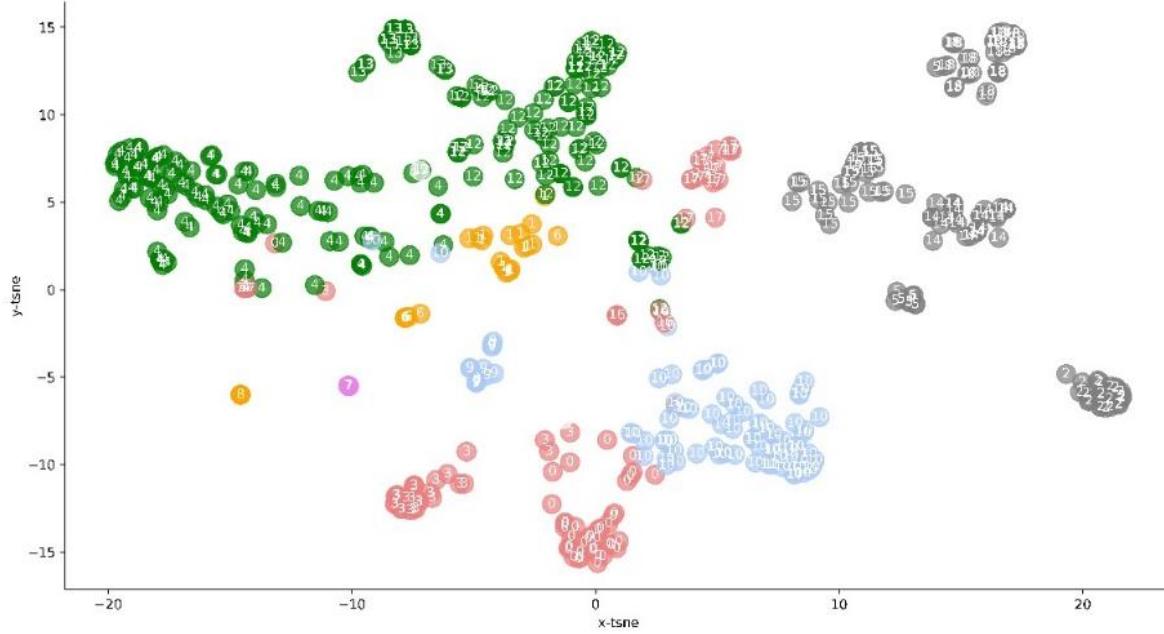
GRI 207 reporting and similarity between firms and over time



This figure shows SBERT similarity patterns of GRI 207 reports. The vector of the GRI 207 standard itself is included in red to indicate the similarity between the wording in standard and individual firm reports. Disclosures in the first year of reporting are shown as green dots, and disclosures in the second year of GRI 207 disclosures are shown as blue crosses. We use the k-neighbor-based graph learning algorithm UMAP described in McInnes, Healy, and Melville [2020] to reduce the n-dimensions to three dimensions, allowing us to present the vectors in a 3D scatterplot. The distribution of the vectors within the scatterplot enables the visualization that the interyear similarity of reports within companies is high (i.e., very low distance between the circles and crosses; median similarity 96 percent). In contrast, the similarity between firms (median similarity 62.9 percent) and the similarity compared to the GRI 207 standard (median similarity 62.1 percent) is generally lower (i.e., higher distance between the points). Both UMAP and SBERT are described in Appendix D.

FIGURE 2

LDA Content Analysis



This figure shows a two-dimensional *t*-SNE clustering of documents based on their topic distributions derived from LDA. Each point represents a document that is plotted according to its topic composition similarity to other documents. *t*-SNE, a machine learning algorithm for dimensionality reduction, is utilized here to project the high-dimensional topic vectors into a two-dimensional space, preserving the similarity relationships. This combination of LDA and *t*-SNE provides a visual tool for understanding complex thematic data and identifying patterns and relationships that are not immediately apparent from raw GRI 207 textual data alone. Colors indicate the predominant topic of each document, as identified by the LDA model. Specific color assignments are as follows: green for Tax Strategy topics, blue for Compliance topics, red for Risk Management topics, violet for Economic Impact topics, gray for CBCR disclosure topics, and orange for Generic Language topics. LDA is described in Appendix D.

FIGURE 3

Coding of PRE and POST Periods

Panel A: Adoption in 2019

ID	Year	GRI207 report	Time to Event	PRE3	PRE2	PRE1	POST0	POST1	POST2	POST3
1	2016	0	- 3	1	0	0	0	0	0	0
1	2017	0	- 2	0	1	0	0	0	0	0
1	2018	0	- 1	0	0	1	0	0	0	0
1	2019	1	0	0	0	0	1	0	0	0
1	2020	1	1	0	0	0	0	1	0	0
1	2021	1	2	0	0	0	0	0	1	0
1	2022	1	3	0	0	0	0	0	0	1
1	2023	1	4	0	0	0	0	0	0	0

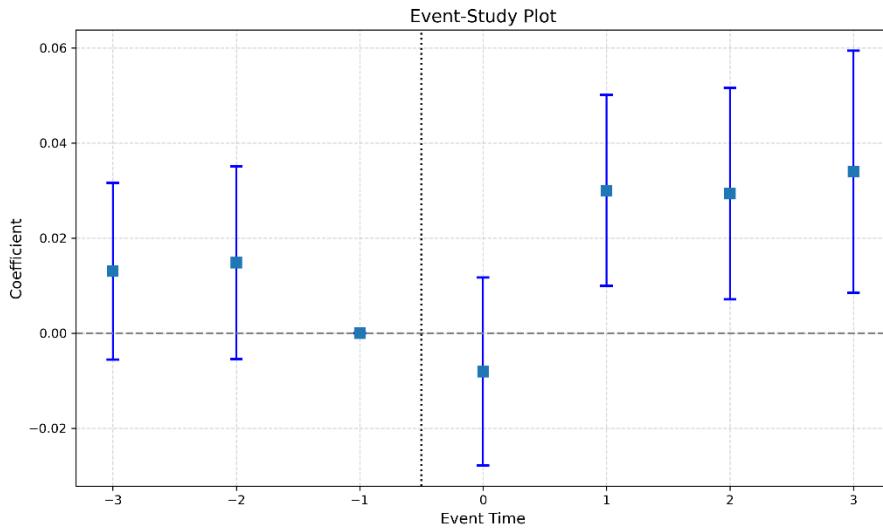
Panel B: Adoption in 2020

ID	Year	GRI207 report	Time to Event	PRE3	PRE2	PRE1	POST0	POST1	POST2	POST3
2	2016	0	- 4	0	0	0	0	0	0	0
2	2017	0	- 3	1	0	0	0	0	0	0
2	2018	0	- 2	0	1	0	0	0	0	0
2	2019	0	- 1	0	0	1	0	0	0	0
2	2020	1	0	0	0	0	1	0	0	0
2	2021	1	1	0	0	0	0	1	0	0
2	2022	1	2	0	0	0	0	0	1	0
2	2023	1	3	0	0	0	0	0	0	1

This figure provides two examples to better illustrate how we code the dynamic PRE and POST periods for our analyses. In line with prior studies, we bin leads at final endpoints (Clarke and Tapia-Schythe [2021], Rauter [2020], Bilicka et al. [2025]). Never-treated firms serve as pure controls.

FIGURE 4

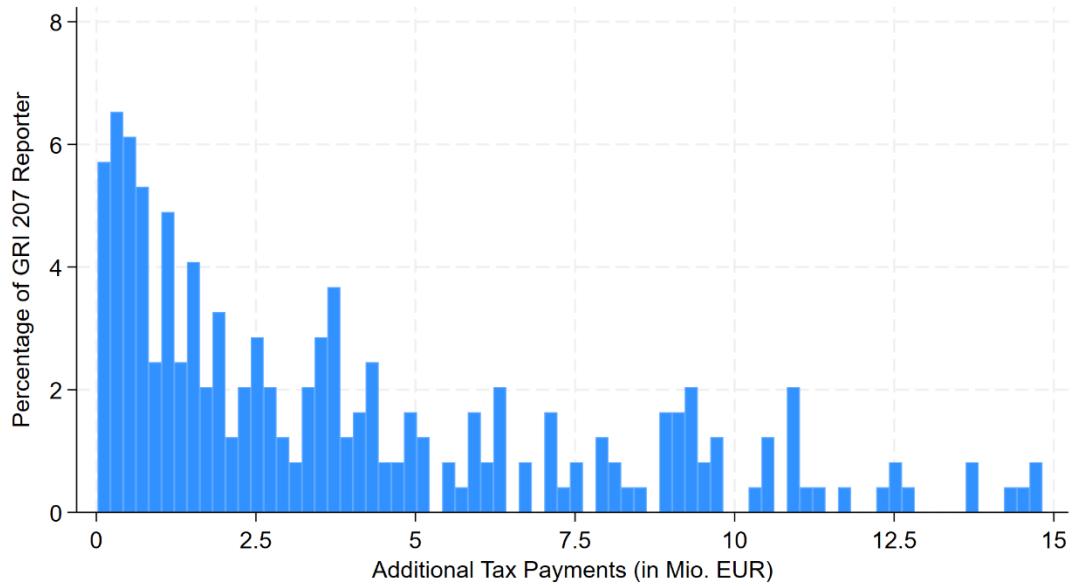
GAAP ETR patterns of GRI 207-adopting firms in event time



This figure shows *GAAP ETR* patterns for GRI 207 adopters over the event period and presents the coefficients of the regression analysis examining the effect of GRI 207 adoption on *GAAP ETRs*. The event date is the year in which a firm first adopts and discloses tax-related information in accordance with GRI 207 ($t = 0$). The indicator for year $t-1$, which serves as the benchmark period, is omitted. Vertical bands represent 95 percent confidence intervals for the point estimates in each period. In line with prior studies, event leads are binned at final endpoints (Clarke and Tapia-Schythe [2021], Rauter [2020], Bilicka et al. [2025]).

FIGURE 5

Distribution of Additional Tax Payments



The histogram presents the distribution of additional income tax payments at the observation level, measured in EUR, for firms that report under GRI 207. The x-axis shows the amount of additional tax payments, ranging from €0 to over €12.5 million. The y-axis indicates the percentage of GRI 207 reporters within each tax payment bin. Each bar represents a bin of additional tax payment values and shows the proportion of GRI 207-reporting observations falling within that bin.

TABLES

TABLE 1

Sample Selection and GRI 207 Adoption

Panel A: Sample Selection Steps

	Unique Firms	Firm-Years
EU listed firms according to Refinitiv (as of 12/31/2023)	3,976	
Firms not matched to Corporate Register	(3,038)	
EU listed firms with GRI reports	938	
Less extractive and financial services industry	(226)	
Less delisting between 2019 and 2023	(63)	
Less non-English reports	(51)	
Less missing GRI Content Index	(60)	
Total number of firms	538	4,304
Less loss observations		(632)
Less missing complete data		(487)
Final sample		3,185

Panel B: GRI 207 Adoption by Year

	Unique Firms	Firm-Years
Total number of GRI-reporting firms in the sample	538	
Thereof GRI 207 adoption in 2019	13	
Thereof GRI 207 adoption in 2020	139	
Thereof GRI 207 adoption in 2021	48	
Thereof GRI 207 adoption in 2022	35	
Thereof GRI 207 adoption in 2023	5	
Total number of GRI 207 adopters and reports	240	840

Panel A in this table summarizes the sample selection procedure for this study. The sample covers the financial periods from 2016 to 2022. Panel B shows how many firms adopted GRI 207 in the respective years.

TABLE 2
Descriptive Statistics

Panel A: Company Fundamentals

Full Sample							
	n	Mean	Std. Dev.	Median	GRI 207 Reporter = 0	GRI 207 Reporter = 1	t test of Means [t statistic]
					n = 1,678	n = 1,507	
<i>GAAPET</i> <i>R</i>	3,185	0.2510	0.1203	0.2394	0.2485	0.2536	-1.1928
<i>SIZE</i>	3,185	21.6668	1.6856	21.7116	21.4751	21.8803	-6.8219***
<i>LEV</i>	3,185	0.5842	0.1539	0.5880	0.5733	0.5963	-4.2318***
<i>ROA</i>	3,185	0.0749	0.0519	0.0625	0.0756	0.0741	0.7823
<i>CAPINT</i>	3,185	0.2489	0.1933	0.2111	0.0047	0.0050	-0.8950
<i>INVINT</i>	3,185	0.1082	0.1085	0.0882	0.1149	0.1006	3.7265***
<i>RD</i>	3,185	0.0093	0.0218	0.0000	0.0104	0.0081	3.0385***
<i>REGULATI</i> <i>ON</i>	3,185	0.7410	0.4382	1	0.7098	0.7757	-4.2517***
<i>STR</i>	3,185	0.2581	0.0475	0.2500	0.2508	0.2661	-9.2616***

Panel B: Change in Company Fundamentals

Full Sample							
	n	Mean	Std. Dev.	Median	GRI 207 Reporter = 0	GRI 207 Reporter = 1	t test of Means [t statistic]
					n = 1,480	n = 1,327	
Δ <i>GAAP</i> <i>ETR</i>	2,807	-0.0119	0.1218	0.0000	-0.0126	-0.0111	-0.3045
Δ <i>SIZE</i>	2,806	0.0496	0.3303	0.0521	0.0452	0.0545	-0.7384
Δ <i>LEV</i>	2,806	-0.0029	0.0516	-0.0039	-0.0041	-0.0014	-1.3843
Δ <i>ROA</i>	2,806	0.0042	0.0393	0.0018	0.0039	0.0043	-0.2320
Δ <i>CAPINT</i>	2,806	0.0032	0.0369	0.0000	0.0039	0.0024	1.0769
Δ <i>INVINT</i>	2,761	0.0013	0.0213	0.0000	0.0016	0.0010	0.7104
Δ <i>RD</i>	2,806	0.0000	0.0028	0.0000	0.0001	-0.0001	0.3852

(Continued)

TABLE 2 - (Continued)

Panel C: Text Mining Variables (full sample)				
	n	Mean	Std. Dev.	Median
<i>Mitigation</i>	840	14.410	13.526	11.000
<i>Neutral</i>	840	21.913	23.980	14.000
<i>Risk</i>	840	0.0478	0.0828	0.0000
<i>Net_Tone</i>	840	0.0812	0.0521	0.0815
<i>BOG</i>	829	77.106	22.659	76.000
<i>Length</i>	840	1,124	1,014	869.00
<i>Specificity</i>	840	0.1060	0.0595	0.0972
<i>Similarity</i>	837	0.6229	0.0793	0.6353

Panel D: LDA				
	n	Mean	Std. Dev.	Median
<i>Strategy</i>	835	0.2456	0.3193	0.0757
<i>Compliance</i>	835	0.0914	0.2223	0.0008
<i>Risk_Man</i>	835	0.3810	0.3643	0.2997
<i>Impact</i>	835	0.1278	0.2394	0.0019
<i>CBCR</i>	835	0.1177	0.2312	0.0027
<i>Generic</i>	835	0.0365	0.1353	0.0005

Table 2 presents the descriptive statistics for company fundamentals (Panel A) and changes in company fundamentals (Panel B). Both panels show separately the descriptive statistics for the full sample and for the treated and untreated observations. Panel C summarizes the descriptive statistics for the text mining variables examined. All of the variables are defined in Appendix A.

TABLE 3

Correlations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) <i>GAAP ETR</i>		0.0506	0.0023	0.2021	-0.1918	0.0129	0.0405	0.0123	0.1478	0.2636
(2) <i>GRI207</i>	0.0269		0.0852	0.0526	-0.0224	0.0224	-0.0157	-0.0368	0.0623	0.0784
(3) <i>SIZE</i>	-0.0483	0.0843		0.0485	0.1015	-0.0133	-0.1026	0.2654	0.5305	0.1800
(4) <i>LEV</i>	0.1960	0.0473	0.0486		-0.4167	0.0219	-0.1032	-0.1509	0.2764	0.1093
(5) <i>ROA</i>	-0.2157	-0.0120	0.0829	-0.4003		-0.1227	0.1488	0.1410	-0.1266	-0.0740
(6) <i>CAPINT</i>	-0.0175	0.0180	-0.0195	-0.0090	-0.1155		0.0509	-0.1160	0.1394	-0.0321
(7) <i>INVINT</i>	0.0233	-0.0202	-0.1514	-0.1065	0.1413	-0.1324		0.2668	0.0864	-0.0710
(8) <i>RD</i>	-0.0350	-0.0087	0.2087	-0.1964	0.2037	-0.1780	0.0906		0.1549	0.0550
(9) <i>REGULATI ON</i>	0.1154	0.0623	0.5372	0.2702	-0.1543	0.0944	0.0159	0.0213		0.0763
(10) <i>STR</i>	0.1733	0.0446	0.1864	0.1163	-0.0511	-0.0702	-0.1109	0.0079	0.2255	

Table 3 presents the Pearson (on the bottom left) and Spearman (on the top right) correlations for the controls and our primary variables of interest (*GRI207*). Correlations at the 1 percent level are bolded and italicized. All of the variables are defined in Appendix A.

TABLE 4
Analysis of GRI 207 Adoption and Tax Avoidance

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	<i>GAAP ETR</i>	<i>GAAP ETR</i>	<i>GAAP ETR</i>	<i>GAAP ETR</i>	Δ <i>GAAP ETR</i>	<i>TaxDif</i>
<i>GRI207</i>	0.0200*** (2.6887)	0.0158** (2.3212)	0.0130* (1.6785)	0.0233*** (2.9529)	0.0363*** (3.7191)	0.0132* (1.7579)
<i>SIZE</i>	-0.0073 (-1.4612)	-0.0079 (-1.6443)	-0.0094*** (-3.5729)	-0.0070 (-1.0533)	-0.0020 (-0.2623)	-0.0061 (-1.1882)
<i>LEV</i>	0.0260 (0.7037)	0.0265 (0.7523)	0.0887*** (3.6720)	0.0111 (0.2210)	-0.0412 (-0.7484)	0.0142 (3.3868)
<i>ROA</i>	-0.5266*** (-5.7481)	-0.6015*** (-8.1240)	-0.3664*** (-5.6850)	-0.5507*** (-4.6014)	-0.0112 (-0.1149)	-0.5300*** (-5.7041)
<i>CAPINT</i>	-0.0047 (-0.1018)	-0.0127 (-0.3321)	-0.0244 (-1.1768)	-0.0638 (-1.0687)	-0.0061 (-0.0918)	-0.0075 (-0.1623)
<i>INVINT</i>	0.01288 (1.3322)	0.1097 (1.3193)	0.0413 (0.9225)	0.1627 (1.3725)	-0.0605 (-0.4558)	0.1103 (1.1412)
<i>RD</i>	0.0694 (1.1193)	-0.2188 (-0.4082)	0.3201 (1.2461)	-0.0009 (-0.0011)	-0.6557 (-0.9463)	0.0385 (0.0661)
<i>REGULATION</i>	-0.0093 (-0.6513)	-0.0285* (-1.9222)	0.0277*** (3.0905)	0.0072 (0.4492)	0.0151 (0.7487)	-0.0129 (-0.8999)
<i>STR</i>	0.0339 (0.2746)	0.0387 (0.3449)		-0.0279 (-0.2021)	0.0354 (0.2933)	
Δ <i>SIZE</i>				-0.0055 (-0.6295)	-0.0132 (-1.0863)	
Δ <i>LEVERAGE</i>				0.1010 (1.3958)	0.2141** (2.0722)	
Δ <i>ROA</i>				0.0814 (0.8558)	-0.3467*** (-3.1253)	
Δ <i>CAPINT</i>				0.1666* (1.8634)	0.1715 (1.4347)	
Δ <i>INVINT</i>				-0.0273 (-0.2682)	0.1954 (1.0567)	
Δ <i>RD</i>				-0.1024 (-0.0975)	0.2237 (0.1531)	
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	No	Yes	Yes	Yes
Industry FE	No	No	Yes	No	No	No
Country FE	No	No	Yes	No	No	No
Entropy Balancing	Yes	No	Yes	Yes	Yes	Yes
n	3,185	3,185	3,240	2,724	2,724	3,185
R ²	0.5662	0.5158	0.2513	0.5855	0.1879	0.5591

***, **, and * denote statistical significance at the 1 percent, 5 percent, and 10 percent levels (two-tailed), respectively.

Table 4 reports the results of tests that examine the association between GRI 207 adoption and tax avoidance. Year and firm fixed effects are included. Column (3) includes year, industry and country fixed effects. Columns (4) and (5) use change-model specifications. *T*-statistics are reported in parentheses. Standard errors are robust to heteroscedasticity and clustered at the firm level. All of the variables are defined in Appendix A.

TABLE 5

Stacked DiD

Variables	(1) <i>GAAP ETR</i>	(2) <i>GAAP ETR</i>	(3) Δ <i>GAAP ETR</i>	(4) <i>TaxDif</i>
<i>POST0</i>	-0.0081 (-0.8037)	-0.0063 (-0.5085)	0.0091 (0.6018)	-0.0097 (-0.9886)
<i>POST1</i>	0.0300*** (2.9255)	0.0277** (2.0379)	0.0559*** (3.8127)	0.0248** (2.4773)
<i>POST2</i>	0.0293*** (2.5872)	0.0276** (1.9660)	0.0270* (1.7821)	0.0224** (2.0319)
<i>POST3</i>	0.0340*** (2.6149)	0.0347** (2.1938)	0.0329* 1.9060	0.0259** 2.0404
Controls	Yes	Yes	Yes	Yes
Change Controls	No	No	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	No	Yes	Yes
Industry FE	No	Yes	No	No
Country FE	No	Yes	No	No
Observations	7,252	7,170	6,875	7,235
R-squared	0.5521	0.2232	0.1885	0.5388

***, **, and * denote statistical significance at the 1 percent, 5 percent, and 10 percent levels (two-tailed), respectively.

Table 5 reports the results of the stacked DiD tests of tax avoidance. Dynamic event leads and event lags are coded as presented in Figure 1. *POST0* denotes the year of GRI 207 adoption, whereas *POST1* captures the first fiscal year following adoption. All control variables are included but not reported for brevity. All models include year and firm fixed effects. Column (2) includes year, industry and country fixed effects. Column (3) also includes change controls. *T*-statistics are reported in parentheses. Standard errors are robust to heteroscedasticity and clustered at the firm level. All of the variables are defined in Appendix A.

TABLE 6
Robustness Check – Stoxx Europe 600 Control Group

Variables	(1) <i>GAAP ETR</i>	(2) <i>TaxDif</i>
<i>GRI207</i>	0.0137* (1.7545)	0.0136* (1.7520)
Controls	Yes	Yes
Year FE	Yes	Yes
Industry FE	Yes	Yes
n	2,754	2,754
R ²	0.2738	0.2827

***, **, and * denote statistical significance at the 1 percent, 5 percent, and 10 percent levels (two-tailed), respectively.

Table 6 reports the results of the generalized DiD tests of tax avoidance during the sample period 2016 to 2023. In Columns (1) and (2), the sample includes GRI 207 reporters of the main sample and firms in the EURO Stoxx 600 that do not adopt the GRI standards at all. All control variables are included but not reported for brevity. All models include year and industry fixed effects. The *t* statistics are reported in parentheses. Standard errors are robust to heteroscedasticity and clustered at the firm level. All of the variables are defined in Appendix A.

TABLE 7

Content and Tax Avoidance

Variables	(1) <i>GAAP ETR</i>	(2) Δ <i>GAAP ETR</i>	(3) <i>TaxDif</i>
<i>STRATEGY</i>	0.0486*** (3.0554)	0.0291** (2.2595)	0.0529*** (3.0659)
<i>COMPLIANCE</i>	0.0157 (0.7042)	0.0605** (2.1333)	0.0028 (0.1229)
<i>RISK_MAN</i>	-0.0075 (-0.6134)	0.0270 (1.5900)	-0.0148 (-1.1529)
<i>IMPACT</i>	0.0180 (0.9933)	0.0211 (0.9801)	0.0011 (0.0572)
<i>CBCR</i>	0.0087 (0.4599)	0.0386 (1.4966)	0.0110 (0.5949)
<i>GENERIC</i>	-0.0081 (-0.2309)	-0.0190 (-0.2892)	-0.0178 (-0.5135)
Controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Entropy Balancing	Yes	Yes	Yes
n	3,339	2,856	3,254
R ²	0.5590	0.1689	0.5541

Table 7 showcases the results from a generalized DiD analysis that investigates the association between the content of GRI 207 reports and patterns of tax avoidance from 2016 to 2023. All control variables are included but not reported for brevity. All models include year and firm fixed effects, Entropy balancing according to Hainmueller (2012) is used. The *t* statistics are reported in parentheses. Standard errors are robust to heteroscedasticity and clustered at the firm level. All of the variables are defined in Appendix A.

***, **, and * denote statistical significance at the 1 percent, 5 percent, and 10 percent levels (two-tailed), respectively.

TABLE 8
Risk Sentiment in GRI 207 Disclosures and Tax Avoidance

Variables	Risk Mitigation			Risk Neutral			Risk		
	(1) GAAP ETR _t	(2) Δ GAAP ETR _t	(3) TaxDif _t	(4) GAAP ETR _t	(5) Δ GAAP ETR _t	(6) TaxDif _t	(7) GAAP ETR _t	(8) Δ GAAP ETR _t	(9) TaxDif _t
<i>MITIGATION_{t-1}</i>	0.1838*** (3.1961)	0.2505*** (2.8099)	0.1927*** (3.3263)						
<i>Δ MITIGATION_t</i>	0.1637*** (4.4749)	0.2958*** (4.8813)	0.1645*** (4.5179)		-0.0219 (-0.2303)	0.0062 (0.0390)	-0.0270 (-0.2859)		
<i>NEUTRAL_{t-1}</i>									
<i>Δ NEUTRAL_{t-1}</i>					-0.0809 (-1.3476)	-0.1042 (-1.0964)	-0.0814 (-1.3639)		
<i>RISK_{t-1}</i>							-0.0518 (-1.0079)	-0.0431 (-0.4890)	-0.0532 (-1.0373)
<i>Δ RISK_{t-1}</i>							-0.0274 (-0.7421)	-0.0193 (-0.3138)	-0.0295 (-0.7901)
<i>NET_TONE_{t-1}</i>	-0.0504 (-1.3902)	-0.0820 (-1.2655)	-0.0561 (-1.5760)	-0.0166 (-0.4595)	-0.0303 (0.4424)	-0.0214 (-0.6091)	-0.0225 (-0.5852)	-0.0325 (-0.4599)	-0.0275 (-0.7388)
<i>Δ NET_TONE_t</i>	-0.0305 (-1.3707)	-0.0331 (-1.2655)	-0.0322 (-1.5760)	-0.0142 (-0.6355)	-0.0053 (-0.1494)	-0.0158 (-0.7211)	-0.0135 (-0.6104)	-0.0004 (-0.0116)	-0.0156 (-0.7170)
<i>BOG_{t-1}</i>	-0.0249 (-0.5956)	-0.0334 (-0.5430)	-0.0322 (-0.6551)	0.0055 (0.1205)	0.0089 (0.1284)	0.0048 (0.1073)	0.0012 (0.0265)	0.0029 (0.0401)	0.0006 (0.0141)
<i>Δ BOG_t</i>	-0.0139 (1.430)	-0.0151 (-0.2562)	-0.0151 (-0.3904)	0.0194 (0.4741)	0.0515 (0.7791)	0.0177 (0.4360)	0.0193 (0.4556)	0.0500 (0.7352)	0.0177 (0.4237)
<i>LENGTH_{t-1}</i>	-0.1257** (-2.1491)	-0.2906** (-3.2669)	-0.1286** (-2.2664)	0.0202 (0.1942)	-0.1154 (-0.6660)	0.0271 (0.2661)	0.0165 (0.3118)	-0.0972 (-1.1246)	0.0194 (0.3745)
<i>Δ LENGTH_t</i>	-0.1104** (-2.2396)	-0.2637*** (-3.2469)	-0.1125** (-2.2981)	0.0894 (1.3874)	0.0726 (0.7332)	0.0879 (1.3926)	0.0365 (0.8974)	0.0019 (0.0285)	0.0350 (0.8839)
<i>SPECIFICITY_{t-1}</i>	0.0284 (0.5197)	0.0182 (0.2119)	0.0262 (0.4869)	-0.0138 (-0.2351)	-0.0391 (-0.4260)	-0.0180 (-0.3126)	-0.0125 (-0.2315)	-0.0307 (-0.3648)	-0.0174 (-0.3314)
<i>Δ SPECIFICITY_t</i>	0.0347 (1.1502)	0.0709 (1.4204)	0.0300 (1.0401)	0.0112 (0.3509)	0.0205 (0.4229)	0.0067 (0.2145)	0.0045 (0.1437)	0.0123 (0.2572)	-0.0000 (-0.0003)
<i>SIMILARITY_{t-1}</i>	-0.0611 (-1.2034)	-0.0941 (-1.0041)	-0.0550 (-1.0837)	-0.0856* (-1.9547)	-0.1321 (-1.6173)	-0.0802* (-1.8217)	-0.0852* (-1.8817)	-0.1320 (-1.5866)	-0.0798* (-1.7589)
<i>Δ SIMILARITY_t</i>	-0.017 (-0.9211)	-0.0320 (-0.4923)	-0.0347 (-0.8783)	-0.0416 (-1.1042)	-0.0388 (-0.6413)	-0.0399 (-1.0650)	-0.0419 (-1.0771)	-0.0386 (-0.6230)	-0.0403 (-1.0423)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
n	408	407	408	408	407	408	408	407	408
R ²	0.7897	0.4910	0.7995	0.7724	0.3992	0.7739	0.7706	0.3945	0.7723

***, **, and * denote statistical significance at the 1 percent, 5 percent, and 10 percent levels (two-tailed), respectively. Table 8 reports the results of tests that examine the association between risk sentiment and the 1-year-ahead reduction in tax avoidance. For brevity, all of the control variables are included but not reported. In all models, year and firm fixed effects are included. The *t* statistics are reported in parentheses. Standard errors are robust to heteroscedasticity and clustered at the firm level. All of the variables are defined in Appendix A.

APPENDIX A

Variable Definitions

Variables	Definition
Tax avoidance measures	
<i>GAAP ETR</i>	Book tax expenses scaled by pretax income. Observations with negative pretax income and/or negative book tax expenses are excluded (Refinitiv).
$\Delta \text{GAAP ETR}$	$\text{GAAP ETR}_t - \text{GAAP ETR}_{t-1}$
<i>TAX DIF</i>	$\text{GAAP ETR} - \text{STR}$
Primary variables of interest	
<i>GRI207</i>	Indicator variable equal to 1 if the firm reports in accordance with GRI 207 for a financial year t and 0 otherwise (hand collected).
<i>POSTX</i>	Difference in the X years to the reporting period between treated and control groups in relation to the prevailing difference in the omitted base period (hand collected). <i>POST0</i> denotes the year of GRI 207 adoption, while <i>POST1</i> captures the first fiscal year following adoption. <i>POST2</i> and <i>POST3</i> capture the second and third fiscal years following the adoption, respectively.
Control variables	
<i>STR</i>	Statutory tax rate of country c in year t (OECD Stat).
ΔSTR	$\text{STR}_t - \text{STR}_{t-1}$
<i>SIZE</i>	Natural log of market capitalization as of the end of year t (Refinitiv).
ΔSIZE	$\text{SIZE}_t - \text{SIZE}_{t-1}$
<i>LEV</i>	Total liabilities scaled by total assets as of the end of year t (Refinitiv).
ΔLEV	$\text{LEV}_t - \text{LEV}_{t-1}$
<i>ROA</i>	Pretax income scaled by total assets as of the end of year t (Refinitiv).
ΔROA	$\text{ROA}_t - \text{ROA}_{t-1}$
<i>CAPINT</i>	Property, plant and equipment scaled by total assets as of the end of year t (Refinitiv).
ΔCAPINT	$\text{CAPINT}_t - \text{CAPINT}_{t-1}$
<i>INVINT</i>	Inventories scaled by total assets as of the end of year t (Refinitiv).
ΔINVINT	$\text{INVINT}_t - \text{INVINT}_{t-1}$
<i>RD</i>	R&D expenses scaled by total assets as of the end of year t (Refinitiv).
ΔRD	$\text{RD}_t - \text{RD}_{t-1}$
<i>REGULATION</i>	Dummy equal to one if the company is subject to the EU private CbCR and public CbCR and to Pillar 2 (threshold: €750 million revenues as of the end of year t), zero otherwise (Refinitiv).
<i>CAPEX</i>	Disclosed capital expenditures related to assets or processes associated with taxonomy-aligned economic activities as of the end of year t (Refinitiv).
<i>INCOME_TAXES</i>	Book tax expenses as of the end of year t (Refinitiv).
<i>GRI_REPORTER</i>	Indicator variable equal to 1 if the firm reports in accordance with GRI standards for financial year t and 0 otherwise (hand collected).

Variables	Definition
Textual Characteristics	
<i>MITIGATION</i>	Percentile ranking of tax risk mitigating sentences in firm's GRI 207 reporting measured using <i>TaxBERT</i> . $MITIGATION_t - MITIGATION_{t-1}$
$\Delta MITIGATION$	
<i>NEUTRAL</i>	Percentile ranking of tax risk neutral sentences in firm's GRI 207 reporting measured using <i>TaxBERT</i> . $NEUTRAL_t - NEUTRAL_{t-1}$
$\Delta NEUTRAL$	
<i>RISK</i>	Percentile ranking of tax risk increasing sentences in firm's GRI 207 reporting measured using <i>TaxBERT</i> . $RISK_t - RISK_{t-1}$
$\Delta RISK$	
<i>NET_TONE</i>	Percentile ranking of Net Tone in the firm's first year of GRI 207 reporting measured using a machine learning approach. $NET_TONE_t - NET_TONE_{t-1}$
ΔNET_TONE	
<i>BOG</i>	Percentile ranking of the BOG index of the firm's first year of GRI 207 reporting (Stylewriter4). $BOG_t - BOG_{t-1}$
ΔBOG	
<i>LENGTH</i>	Percentile ranking of the number of words in the firm's first year of GRI 207 reporting. $LENGTH_t - LENGTH_{t-1}$
$\Delta LENGTH$	
<i>SPECIFICITY</i>	Percentile ranking of the number of specific words scaled by the number of words in the firm's first year of GRI 207 reporting. $SPECIFICITY_t - SPECIFICITY_{t-1}$
$\Delta SPECIFICITY$	
<i>SIMILARITY</i>	Percentile ranking of the similarity between the firm's first year of GRI 207 disclosure and the wording in the GRI 207 standard. $SIMILARITY_t - SIMILARITY_{t-1}$
$\Delta SIMILARITY$	
Content Measures	
<i>STRATEGY</i>	Proportion of tax strategy topics in the GRI 207 report z of firm i in year t , as derived from LDA, in the range from 0 to 1.
<i>COMPLIANCE</i>	Proportion of tax compliance topics in the GRI 207 report z of firm i in year t , as derived from LDA, in the range from 0 to 1.
<i>RISK_MAN</i>	Proportion of tax risk management topics in the GRI 207 report z of firm i in year t , as derived from LDA, in the range from 0 to 1.
<i>IMPACT</i>	Proportion of economic impact topics in the GRI 207 report z of firm i in year t , as derived from LDA, in the range from 0 to 1.
<i>CBCR</i>	Proportion of CbCR topics in the GRI 207 report z of firm i in year t , as derived from LDA, in the range from 0 to 1.
<i>GENERIC</i>	Proportion of generic and unspecific language topics in the GRI 207 report z of firm i in year t , as derived from LDA, in the range from 0 to 1.

APPENDIX B

GRI 207 example

In the following, we present selected excerpts from GRI 207 disclosures, covering the four components GRI 207-1 through GRI 207-4.

GRI 207-1 requires firms to describe their approach to tax. The following excerpt is taken from NH Hotel Group's 2020 sustainability report:

[...] The Tax Strategy for NH Hotel Group (available at nh-hotels.com/corporate > Corporate Governance > Policies) was approved by the Board of Directors on July 27th, 2015, considering that one of the pillars underpinning the entire Group's business strategy should be avoiding or minimising risks, including tax risks. The strategy is based on complying with tax legislation in all the jurisdictions in which NH Hotel Group is present, applying an interpretation of such legislation that fundamentally has due regard for the spirit and purpose of the laws. NH Hotel Group S.A. is signed up to the Spanish Tax Agency's Code of Good Tax Practice. The purpose of that Code is to promote a reciprocally cooperative relationship between the Tax Agency and the different companies that have signed up to the Code. This relationship is based on the principles of transparency and mutual trust, with the aim of reducing the legal uncertainty to which companies may be exposed with the tax authorities. Guiding Principles of the Tax Strategy:

- *Compliance with tax legislation in all locations where it is present.*
- *Prevention and reduction of significant tax risks.*
- *Collaboration, loyalty and good faith with the Tax Administrations.*
- *Reporting to the Board of Directors on the main tax implications of transactions.”*

GRI 207-2 requires firms to describe their tax governance, control and risk management.

The following excerpt is taken from Neodecortech's 2020 sustainability report:

[...] The Chief Financial Officer (CFO), assisted by the Administration, Finance and Control Department, defines tax strategy and planning policies, also aided by external consultants, in order to comply with national and international tax regulations and take advantage of the tax opportunities granted by the national tax authorities (tax credits, patent boxes, etc.), and defines tax risk governance with support from the Compliance & Risk Management function, thereby minimizing the risks of non-compliance with current tax regulations and avoiding incurring administrative and criminal sanctions, as well as reputational risks. Employees or third parties with knowledge of the facts may report unethical or illegal conduct in tax matters, either directly to the CFO or through the whistleblowing system adopted by the Company.”

GRI 207-3 requires firms to provide disclosures on stakeholder engagement and management of concerns related to tax. The following excerpt is taken from Telecom Italia's 2021 sustainability report:

[GRI 207-3] In the materiality matrix, the topic is included in corporate conduct. To date, the Group has not received any solicitation from its stakeholders in regard to tax aspects. Should such occur, they will be processed by the company departments assigned to deal with the relevant compliance matters.”

GRI 207-4 requires firms to provide Public CbCR. The following excerpt is taken from Piaggio & C S.p.A.'s 2021 sustainability report:

COUNTRY	DESIGNATION	ACTIVITIES	ANNO 2020					
			NO. OF EMPLOYEES	REVENUES FROM THIRD PARTIES	REVENUES FROM THE GROUP	PRE-TAX PROFIT (LOSS)	PROPERTY, PLANT AND EQUIPMENT	TAXES PAID
IN MILLIONS OF EUROS								
Italy	Piaggio & C. Sp.A.	Production and sale of vehicles						
	Aprilia Racing S.r.l.	Research and development						
	Piaggio Concept Store Mantova S.r.l.	Commercial distributor						
	Total Italy		3,057	852	121	45	174	6
Croatia	Piaggio Hrvatska Doo	Commercial distributor	9	3				
France	Piaggio France SAS	Selling agency	41		6	1		1
Germany	Piaggio Deutschland GMBH	Selling agency	31		4	1		
Greece	Piaggio Hellas S.A.	Commercial distributor	19	28		1	1	
Holland	Piaggio Vespa B.V.	Holding company and selling agency	20		4	16		
Spain	Piaggio Espana SL	Selling agency						
	Nacional Motor S.A.	Inactive						
	Total Spain		32		4	(4)		
UK	Piaggio Limited	Selling agency	19		2			
USA	Piaggio Group Americas Inc.	Commercial distributor						
	Piaggio Advanced Design Center Corp.	Research and development						
	Piaggio Fast Forward Inc.	Research and development						
	Total USA		103	58	2	(16)	1	
India	Piaggio Vehicles Pvt Ltd	Production and sale of vehicles	1,550	245	27	10	67	3
Vietnam	Piaggio Vietnam Co. Ltd.	Production and sale of vehicles	854	162	131	39	25	5
Indonesia	Pt. Piaggio Indonesia	Selling agency	31	34		2		1
Singapore	Piaggio Asia Pacific Ltd	Selling agency	16		3	1		
Japan	Piaggio Group Japan	Selling agency	10	8				
China	Piaggio China Co Ltd.	Holding						
	Foshan Piaggio Vehicles Tech. Dev. Co. Ltd.	Research and development						
	Total China		64	48	3	5	1	1
Brazil	AWS do Brasil	Inactive						
	Aprilia Brasil	Inactive						
	Total Brazil							
	Grand total				100	268		24
	Consolidation entries				(50)	(3)		
	Total consolidated		5,856	1,438	308	50	265	17
								24

APPENDIX C

TaxBERT examples

Appendix C provides examples of risk mitigating sentences as classified by *TaxBERT*:
A2A S.p.A. (2022):

“In addition, in order to guarantee a correct tax management process, the Group is continuing to implement and include in the context of the Internal Control and Risk Management System (ICRMS), the Tax Risk Management and Control Model (Tax Control Framework - TCF), in line with the OECD guidelines and with the domestic regulations that implement them.”

Acciona S.A. (2020):

“ACCIONA has established a transfer pricing policy and a definition of the value chain for all its operations between related parties and entities, following the principles of free competition, creation of value through functions and assets, and assumption of risks and benefits. The group will not consider the implementation of artificial corporate structures, based on opacity or with little/no economic substance.”

Adidas AG (2020):

“The Corporate Tax team reviews our tax strategy on an annual basis, with significant changes being approved by our Chief Financial Officer (CFO).”

Aena S.M.E., S.A. (2021):

“In this sense, the company, within the Code of Good Practices, participates in different forums with the Tax Agency and with other third parties in order to reinforce its fiscal transparency.”

Amadeus IT Group, S.A. (2020)

“Amadeus also endeavors to meet the highest standards of the business community in which it operates, with the aim of being recognized for its best practices and programs in terms of corporate and tax governance.”

APPENDIX D

Text mining tasks

Appendix D outlines the implementation of the text mining tasks and describes how the measures were constructed and organized.

BOG

Most of the common readability measures are centered on different ratios of words, syllables, and sentences. Thus, as noted in Loughran and McDonald [2016], these measures might not be adequate when analyzing business documents. As in prior studies, a solution is the inclusion of the advanced BOG Index (Bonsall et al. [2017], Seebeck and Kaya [2023]). The BOG Index is available only via the commercially available software Stylewriter 4. Stylewriter 4 does not allow for looping files, resulting in substantial manual effort. For interpretability and comparability reasons, we transform the scores into percentile rankings.

Latent Dirichlet Analysis (LDA)

LDA is a generative probabilistic model used for topic modeling and natural language processing. LDA assumes that a document is a reflection of latent topics. These topics are distributions over words. Each document in a corpus is considered generated by these topics, where each topic contributes a certain amount to the document. In LDA, both the topic distribution within a document and the word distribution within topics are governed by Dirichlet priors (Blei et al. [2003]). This mathematical framework allows the underlying thematic structure of a large collection of texts to be captured (Bogachev, De Vito, Demere, and Grosetti [2025]). LDA is valuable because it enables the automatic discovery and summary of the main themes in a set of documents without any prior labeling of the data. This makes LDA particularly useful in fields in which understanding the thematic structure of large text collections is crucial.

Similarity Analysis

We employ advanced natural language processing techniques using bidirectional encoder representations from transformers (BERT) models to compute similarity scores among textual data. Despite their computational intensity, BERT models have been demonstrated to achieve significantly greater accuracy than do traditional dictionary-based approaches (Bochkay et al. [2023]). To enhance processing efficiency without sacrificing this accuracy, we utilize a specialized adaptation of BERT called SBERT (Reimers and Gurevych [2019]).

Furthermore, to provide intuitive graphical representations of our findings, we employ the dimensionality reduction technique uniform manifold approximation and projection, or UMAP. UMAP is a dimensionality reduction technique that approximates a high-dimensional manifold using a fuzzy topological structure. By preserving the local and global structures of the data, UMAP is superior for tasks that require retaining the general context of datasets during reduction (McInnes et al. [2020]). By reducing SBERT’s high-dimensional embeddings to three dimensions, UMAP facilitates the visualization of textual data in a three-dimensional vector space. This approach not only simplifies the complexity inherent in high-dimensional data but also aids in the visual exploration and interpretation of the similarity relationships among documents (Figure 3).

Specificity

To calculate specificity scores, we build on a percentile ranking of the number of specific words scaled by the number of words in the firm’s first year of GRI 207 reporting. We use named entity recognition (NER) in the form of the default trained spaCy v3.6 pipeline to identify a wide variety of specific words. NER allows us to find real-word objects (Bochkay et al. [2023]), such as persons, organizations, facilities, countries, cities, states and other locations; specific products; pieces of art; nationalities; religious and political groups; laws; languages; dates; times smaller than a day; percentages; and ordinal and cardinal words.

Tax Risk Sentiment (*TaxBERT*)

Next, we employ *TaxBERT* as domain-adapted BERT model to classify sentences into the three categories “tax risk increasing”, “tax risk neutral”, and “tax risk mitigating” (Hechtner et al. [2025]). Sentences labeled as tax risk increasing typically contain language suggesting exposure to regulatory scrutiny, aggressive tax strategies, or uncertainty in tax positions. Tax risk neutral sentences tend to be factual, descriptive, or procedural without indicating a clear stance on risk. In contrast, tax risk mitigating sentences signal that the firm is taking steps to reduce tax-related exposure, such as strengthening compliance controls or aligning tax practices with ethical standards. As domain-adapted model, *TaxBERT* has been demonstrated to achieve significantly greater accuracy than traditional BERT models including *FinBERT* (Hechtner et al. [2025]). This enhanced performance ensures a more reliable and nuanced categorization of sentence-level content, enabling us to better capture the tone of firms’ GRI 207 disclosures.

Tone

In our study, we employ sentiment analysis techniques to compute tone scores, as described by Huang, Wang, and Yang [2022]. Li [2010] demonstrates the superior accuracy of machine learning methods over traditional approaches in sentiment analysis. Specifically, we utilize a probabilistic supervised learning classifier that leverages a Naïve Bayesian algorithm to determine sentiment scores within a continuous range of [-1, 1], where positive values correspond to positive sentiments and negative values indicate negative sentiments. This choice of classifier is motivated by its ability to effectively handle large datasets with a high-dimensional feature space, which is typical of textual data. To address the challenge of interpretability and ensure comparability across different texts in our corpus, we transform the raw sentiment scores into percentile rankings. This transformation not only normalizes

the scores but also facilitates a more intuitive understanding of sentiment distributions in our dataset.
