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The association between ESG scores and corporate tax outcomes in the European Union

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Abstract

***Research question*:** To what extent are ESG scores associated with corporate tax outcomes in the European Union, evaluated through the effective tax rate and its deviation from the statutory rate, after controlling for financial, institutional, and temporal factors?
Motivation: The increasing importance of ESG reporting has raised questions about whether companies with higher ESG scores also display different tax outcomes. In the European Union, where companies operate under different institutional and tax environments, but under a similar legislative context, understanding this association is relevant for both academic research and policy discussions.
Idea: The paper investigates whether ESG disclosure/performance, measured through the Refinitiv ESG score, is statistically associated with companies' tax outcomes. Tax outcomes are assessed using two indicators: the effective tax rate, measured as GAAP_ETR, and the deviation from the statutory corporate tax rate, measured as Tax_Dev.
Data: The analysis is based on a panel dataset covering 7,020 firm-year observations from 1,097 companies located in 23 European Union member states, over the period 2013–2024. ESG scores and financial indicators are obtained from LSEG Data & Analytics (Refinitiv), while statutory corporate tax rates are collected from OECD database.
Tools: The data were analyzed in the SPSS program, using a linear mixed models with an autoregressive AR(1) structure, including fixed effects for country and year.
Findings: The main and lagged models do not show a statistically significant average association between ESG scores and tax outcomes. However, the Country × ESG interaction is statistically significant for both tax indicators in the full sample, indicating that the aggregate result conceals different national patterns. Profitability and leverage remain the most consistent firm-level correlates.

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Contribution: The paper contributes to the literature on ESG and taxation by showing that ESG scores are not uniformly associated with corporate tax outcomes at EU level, while also identifying relevant cross-country heterogeneity. The findings underline the importance of financial characteristics, institutional settings, and time-specific factors when ESG and taxation are examined together.

Keywords: non-financial reporting, ESG, CSR, ETR, taxation, corporate tax outcomes

JEL codes: M14, M21, M41, H26, K34, Q56

1. Introduction

The expansion of European requirements for non-financial reporting and tax transparency has raised the question of whether sustainability policies are associated with differences in corporate tax outcomes (Adams *et al.*, 2025). Recent literature approaches this relationship with caution. Some studies argue that ESG reporting may exert a disciplinary effect by increasing reputational pressure and public visibility, while others demonstrate that the link between sustainability and taxation remains empirically challenging to establish (Mitroulia *et al.*, 2025; El Ghoul *et al.*, 2026). Consequently, aspect sustained also by Hardeck and Hertl (2014), non-financial transparency is regarded not only as a communication tool but also as a potential indicator of how companies build credibility with stakeholders and meet expectations regarding fiscal responsibility.

Although some contributions address sustainability and taxation separately, the connection between these domains is difficult to overlook. Corporate tax practices directly influence public revenues and, consequently, the state's capacity to support essential economic and social needs (Global Reporting Initiative, 2025). From this perspective, taxation should be viewed not only as a technical issue but also as one related to corporate responsibility. At the same time, Bird and Davis-Nozemack (2018) demonstrate that aggressive tax practices can undermine not only public budgets but also trust in institutional frameworks and the relationship between companies and authorities. While Stephenson and Vracheva (2015) caution that social, environmental, and governance responsibility should not be automatically equated with tax evasion, the two areas remain closely linked when sustainability is understood in relation to the broader effects of corporate activity. Other authors, such as McGill and Outslay (2004), demonstrate how firms used their accounting reporting standards with the aim of reducing tax payments.

Building on this framework, the present study investigates the extent to which non-financial transparency, as reflected by the ESG score, is associated with the tax outcomes of companies in the European Union. Tax outcomes are captured using

two measures: the effective tax rate and its deviation from the statutory corporate tax rate in the country of residence. The selection of a European sample enables the examination of this association within a context characterized by a degree of institutional convergence, while also accounting for national differences that may be associated with the results.

This study is relevant to both the academic community and society by addressing an emerging topic at the intersection of taxation and sustainability. From a scientific perspective, the findings contribute to the literature on the relationship between non-financial transparency and corporate tax outcomes. Furthermore, the European-level analysis allows for the generalization of conclusions beyond a single national context, which is often a limitation in the existing literature (Stephenson & Vracheva, 2015). From a societal perspective, the study clarifies how sustainability policies and ESG reporting, promoted globally, may be discussed in relation to fiscal accountability. In this way, the research supports efforts to build a more sustainable and transparent economy, where financial and social performance are interdependent (Orlitzky *et al.*, 2003).

Moreover, the specialized literature has not thoroughly examined the relationship between non-financial reporting and corporate fiscal outcomes, as highlighted by Mio *et al.* (2025) and Stephenson and Vracheva (2015). Therefore, this study aims to strengthen the academic foundation on this topic and provide a reference point for future research.

2. Literature review

Recent literature shows that the relationship between corporate social responsibility (CSR) and tax avoidance is not a simple one. It is quite complex and largely depends on how the two concepts are defined and measured. This relationship is neither unidirectional nor stable over time. The synthesis conducted by Kovermann and Velte (2021), based on 47 quantitative empirical studies, captures this heterogeneity very well. The authors point out that, at the theoretical level, the link between CSR and tax avoidance remains unclear. It may reflect either a genuine orientation toward stakeholders, strategies for managing reputational risk, or even conflicts of interest between managers and shareholders. Nevertheless, despite this theoretical ambiguity, most of the studies analyzed by the authors indicate a negative relationship between CSR and tax avoidance, suggesting that, on average, firms with a higher level of CSR tend to exhibit more compliant fiscal behavior. However, the results are not uniform, with considerable differences depending on how the variables are measured. For example, it matters which proxy is used for tax avoidance (ETR or book–tax differences), as well as how CSR is defined (actual performance or just reporting). Additionally, the institutional context under analysis plays an important role in these differences.

This distinction between CSR performance and CSR reporting is essential for understanding the differences found in the literature. The details of these two aspects are thoroughly explained in the study by Lanis and Richardson (2012). Analyzing a sample of companies listed in Australia, the authors compare firms accused by the tax authority with a sample of 'clean' companies. They measure the level of CSR in the sample firms based on non-financial reporting, using the content of their public communications. The results show that companies involved in aggressive tax practices tend to report CSR activities more intensively, suggesting that non-financial transparency can function as a legitimization mechanism in the context of problematic fiscal behavior. This conclusion does not directly contradict the results obtained by Kovermann and Velte (2021) but rather highlights that the negative relationship between CSR and tax avoidance is especially valid when CSR reflects actual performance, not just the level of disclosure.

In a similar manner, but from a complementary perspective, Hoi *et al.* (2013) focus on the negative side of CSR, specifically on irresponsible behaviors towards stakeholders. Using KLD scores for a sample of companies listed in the US during 2003–2009, the authors show that firms with a high level of irresponsible CSR are more prone to aggressive tax avoidance. This result appears regardless of the proxy used, whether it is tax sheltering, book-tax differences, or effective tax rates. These results are consistent with the interpretations highlighted by Kovermann and Velte (2021), which suggest that the relationship between CSR and fiscal behavior is closely linked to organizational culture and the quality of internal governance. In this context, both irresponsible CSR and tax aggressiveness can be seen as manifestations of an opportunistic orientation, rather than necessarily the result of a deliberate strategy of compensating reputation through positive CSR.

A different perspective is offered by Davis *et al.* (2016), who explicitly analyze whether socially responsible firms actually pay more taxes. Using a sample of publicly listed US companies and measuring fiscal behavior by the long-run cash effective tax rate (cash ETR) over five years, the authors identify a robust negative relationship between CSR and cash ETR. This conclusion suggests that firms with higher levels of CSR can, at the same time, adopt efficient tax minimization strategies. The results of Davis *et al.* (2016) do not necessarily contradict the conclusions of Lanis and Richardson (2012) or Hoi *et al.* (2013) but rather complement them. They suggest that CSR and fiscal behavior can act as substitutes, especially in contexts where large firms have access to sophisticated tax planning and tax lobbying activities. Thus, the differences between studies can be explained by the type of fiscal proxy used (e.g., long-term cash ETR) and by the explicit inclusion of tax lobbying as a complementary mechanism.

A similar conclusion is drawn by Huseynov and Klamm (2012) who analyze the relationship between corporate social responsibility, tax avoidance and tax

management. They show that the association between CSR and fiscal behavior may vary depending on the type of CSR activities analyzed.

These differences are further accentuated by the difficulty of directly measuring tax evasion or aggressiveness, as highlighted by Hanlon and Heitzman. (2010). The authors show that indicators such as the effective tax rate (GAAP ETR, cash ETR, or long-run cash ETR) capture only part of the fiscal behavior, as they are also influenced by accounting performance and financial reporting decisions. Similarly, book-tax differences may capture the discretionary component of tax avoidance, but can also reflect legitimate differences between accounting and tax rules. Likewise, indicators such as tax sheltering or reserves for uncertain tax positions mainly capture cases that have already been disclosed or contested, limiting their generalizability. Lee *et al.* (2015) argue that differences between accounting and taxable income (book-tax differences - BTD) are used as indicators of financial performance management and tax optimization behavior and are due to different valuation systems for accounting income and taxable income. This variety of proxies explains why the results reported by Lanis and Richardson (2012), Hoi *et al.* (2013), and Davis *et al.* (2016) may seem contradictory. In reality, they are largely compatible if interpreted according to the indicators used.

Based on these aspects, recent literature extends the analysis beyond CSR to standardized ESG scores, which attempt to capture more coherently the non-financial performance of firms. The term ESG was introduced in 2005, derived from the concept of sustainability (Almeyda & Darmansyah, 2019). Friede *et al.* (2015) argue that it is considered one of the main financial tools for assessing sustainability performance and suggest that sustainable investments outperform traditional ones. The ESG score is measured by rating agencies using various methodologies, and the components of the ESG score may differ depending on the entity calculating it (Berg *et al.*, 2022).

In this sense, the study by Binhadab (2025) analyzes the relationship between ESG performance and the effective corporate income tax paid by companies, using cash ETR calculated over a three-year period. In a sample of 299 companies listed in the United Kingdom, included in the FTSE 100 and FTSE 250 indices, the author identifies a positive association between ESG scores and cash ETR. This suggests that firms with higher ESG performance tend to bear a higher effective tax burden. The results align with the disciplinary interpretations of CSR, similar to those indirectly suggested by Kovermann and Velte (2021) but differ from the conclusions of Davis *et al.* (2016). This suggests that the relationship between variables depends greatly on the institutional context. In particular, the case of the United Kingdom, where there are strong institutions and high reputational pressure, may accentuate the role of ESG as a mechanism for fiscal accountability.

In the same line of research, but in a different institutional context, Syahputri (2025) extends the analysis of the relationship between non-financial performance and fiscal behavior to the ASEAN-5 countries, providing additional evidence regarding the role of ESG in the variation of effective tax rates. The author uses the effective tax rate (ETR) as a proxy for tax avoidance, calculated as the ratio between corporate income tax expense and pre-tax profit. In this version, higher ETR values are interpreted as a sign of more compliant fiscal behavior. ESG performance is measured by standardized ESG scores provided by Refinitiv (LSEG Data & Analytics), with values between 0 and 100, intended to capture the quality of environmental, social, and governance practices. Additionally, the study introduces financial constraints as a separate explanatory variable, highlighted by an indicator derived from the Altman Z-score, which reflects the degree of financial vulnerability of firms. The analysis also includes a fairly broad set of firm-level control variables, such as company size (log of total assets), profitability (ROA), leverage, existence of accounting losses, growth opportunities (market-to-book), firm age, and board structure. At the same time, macroeconomic controls such as country, industry, and year fixed effects are considered. The results indicate a positive and significant association between ESG scores and ETR, suggesting that firms with higher ESG performance tend to bear a higher effective tax burden, while financial constraints are negatively correlated with ETR, reflecting an increased propensity for tax avoidance among firms under financial pressure. These results support the disciplinary interpretation of ESG, similar to that highlighted by Binhadab (2025), but also show that the effect of ESG on fiscal behavior does not depend solely on the institutional context. It can also be influenced by internal factors, such as the financial condition of the firm. Complementing these results, Amarna *et al.* (2025) show that the relationship between ESG and fiscal behavior differs depending on the type of tax practices analyzed. The study uses the effective tax rate (ETR), calculated as the ratio between total corporate income tax expense and accounting pre-tax profit, as well as the current effective tax rate (CETR), defined as the ratio between current corporate income tax payable and pre-tax profit. Starting from the statutory tax rate (STR), the authors construct two derived variables. The first is TA1 = STR - ETR, interpreted as a proxy for permanent tax differences, usually associated with facilities or investments with a social and environmental component. The second is TA2 = STR - CETR, which captures temporary tax differences, more closely related to tax avoidance mechanisms through deferral. ESG reporting is measured by a score published by Refinitiv (LSEG Data & Analytics), normalized between 0 and 1. The results show that a higher level of ESG reporting is positively associated with permanent differences and negatively with temporary ones. This suggests more compliant fiscal behavior but does not completely exclude the use of alternative strategies for managing outcomes. Thus, it also explains why studies based only on aggregated ETRs sometimes reach uneven results.

The findings of the above-mentioned studies are further reinforced by Mlaiki *et al.* (2026), who also concluded that a clear relationship between tax transparency and

tax avoidance exists. Using a sample of 475 non-financial companies from seven countries over the period 2013-2022, the authors measure tax avoidance through the effective tax rate (ETR), defined as the ratio of total tax expense to pre-tax income. In terms of tax transparency, unlike prior studies, they rely on the ASSET4 database, using governance score as a proxy, capturing the effectiveness of corporate governance mechanisms. In addition, they incorporate CSR, business ethics, and green innovation as complementary dimensions of responsible corporate behavior. Their results indicate that firms with stronger governance structures are less likely to engage in tax avoidance, and this relationship becomes even more pronounced in the presence of higher levels of CSR, ethical standards, and green innovation.

To extend the analysis beyond indicators based on effective tax rates, Jiang *et al.* (2024) analyze the Chinese market using alternative measures of tax avoidance. The authors examine this behavior through differences between accounting profit and taxable profit, as well as through an adjusted version of these differences (DDBTD), defined as the residual of a regression of BTD on total accruals, in order to capture the discretionary component of tax avoidance. Similarly with the results of Mlaiki *et al.* (2026), Jiang *et al.* (2024) results show that firms with higher ESG performance tend to have a lower level of tax avoidance. In addition, the study identifies several clear mechanisms through which this effect occurs. For example, ESG can act as a disciplinary factor by reducing financial constraints, improving internal control, and increasing external monitoring, including through greater interest from analysts.

Authors such as Revelli and Viviani (2015), von Wallis and Klein (2015), and Hornuf and Yüksel (2024) argue that investors can make decisions by integrating ESG criteria into the preliminary analysis process without incurring a systematic opportunity cost, and the study by Edmans (2023) considers that ESG investments represent intangible assets that generate long-term social and financial returns comparable to those of traditional investments.

In this respect, the paper supports the idea that ESG limits opportunistic fiscal behaviors but also shows that the differences between results are not only due to the institutional context. They also depend on the fiscal indicators used and the organizational mechanisms through which ESG exerts its effect.

Additionally, Dyreng *et al.* (2008) introduce in their study a new way of measure for the tax avoidance, more exactly the long-run cash ETR. This is designed to capture the effective tax burden of companies over an extended period. The authors define this indicator as the ratio of cash taxes actually paid to accounting profit before tax. To test it, they use a sample of 2,077 publicly listed U.S. firms over the period 1995–2004. Their findings suggest that, unlike annual effective tax rates, the long-run cash ETR provides a more stable and meaningful picture of a company's ability to reduce its tax burden over time.

Overall, the prior literature shows that the relationship between ESG, CSR, non-financial disclosure, and corporate taxation is complex and highly sensitive to the way in which both ESG-related constructs and tax outcomes are measured. Some studies identify a negative association between CSR/ESG performance and tax avoidance, while others suggest that non-financial disclosure may also serve reputational or legitimizing purposes. Moreover, the use of ETR-based indicators may capture only part of corporate tax outcomes, as these measures are also influenced by accounting rules, profitability, firm structure, and institutional conditions.

Based on this literature, the empirical analysis is guided by the following non-causal hypotheses:

H_1: *There is a statistically significant association between ESG scores and corporate tax outcomes in the European Union, measured through effective tax rate and the deviation from the statutory corporate standard rate.*

H_2: *The association between ESG scores and corporate tax outcomes may also be observed with a time lag, such that prior-year ESG scores are statistically associated with current corporate tax outcomes*

3. Research methodology

This research analyzes the relationship between ESG disclosure/performance, reflected by the Refinitiv ESG score, and corporate tax outcomes in the European Union, captured by the effective tax rate and its deviation from the statutory rate in the country of residence. The analysis is based on panel data at the firm-year level for the period 2013–2024. A multi-country approach was used, as specialized literature shows that the relationship between CSR/ESG and tax avoidance strongly depends on the institutional context, the fiscal indicators used, and the way ESG is defined and measured (Kovermann & Velte, 2021; Hanlon & Heitzman, 2010). At the same time, more recent studies suggest that ESG reporting and governance can be associated with reputational pressure and more rigorous external monitoring (Mitroulia *et al.*, 2025; El Ghoul *et al.*, 2026). However, empirical results are not uniform, and there is also evidence indicating that ESG may function either as a substitute for other control mechanisms or as a legitimization instrument (Davis *et al.*, 2016; Lanis & Richardson, 2012).

Based on these premises, this research aims to answer the question of the extent to which ESG scores are associated with corporate tax outcomes in the European Union, evaluated by the effective tax rate and its deviation from the statutory rate, after controlling for financial, institutional, and temporal factors. In addition, given the importance attributed by the literature to the national context, the analysis

examines whether this association differs across EU countries. The research question is: To what extent are ESG scores associated with corporate tax outcomes in the European Union, and does this association differ across countries after controlling for financial, institutional, and temporal factors? The research strategy is designed to capture differences between countries and years, firm-level heterogeneity, and temporal dependence of the data.

Firm-level data (ESG score and financial indicators) are sourced from the Refinitiv (LSEG Data & Analytics) database, while statutory corporate tax rates are collected at the country and year level using the OECD database (it is used the combined corporate income tax, in order to better capture the differences between countries). The database is organized in long format, with each observation corresponding to a firm in a given year. The sample covers 23 EU countries, and after the cleaning process and conditioning on the availability of ESG data and control variables, the final sample used in the contemporaneous models includes 7,020 firm-year observations for 1,097 firms. The models based on the one-year lag of ESG include 6,129 observations, as the first observation available for each firm and observations that are not consecutive in time cannot receive a valid lagged ESG value.

Tax outcomes are measured in two complementary ways to reduce reliance on a single proxy, given the well-known limitations of effective tax rates (Hanlon & Heitzman, 2010). Specifically, the combined statutory corporate income tax rate is converted to decimal form, and the GAAP effective tax rate (GAAP_ETR) is calculated as the ratio between total corporate income tax expense (TaxTotal) and pre-tax profit (PBT), for positive profit values. Additionally, to ensure comparability between countries, the deviation from the statutory rate (Tax_Dev) is computed as the combined statutory corporate income tax rate minus GAAP_ETR. Higher positive values therefore indicate an effective tax rate below the statutory rate, values close to zero indicate approximate alignment, while negative values indicate an effective rate above the statutory rate.

In this study, the ESG score is treated as an aggregate proxy for non-financial disclosure/performance, not as direct evidence of specific corporate tax practices or fiscal responsibility. Similarly, GAAP_ETR and Tax_Dev are accounting-based proxies for corporate tax outcomes and do not fully capture tax avoidance, tax evasion, or managerial intentions. Therefore, the analysis focuses on whether variations in ESG scores are observed together with variations in corporate tax outcomes. Throughout the study, the term corporate tax outcomes is used to refer to the empirical measures examined. The term tax avoidance is used only when discussing previous studies that explicitly interpret their indicators as proxies for tax avoidance, since GAAP_ETR and Tax_Dev do not directly identify firms' intentions or specific tax practices.

The set of control variables follows common practice in the literature on ETR-based corporate tax outcomes. It includes firm size (SIZE), measured as the natural logarithm of total assets, profitability (ROA), calculated as EBIT divided by total assets, leverage (LEV), calculated as total debt divided by total assets, as well as capital intensity (CAPINT) and intangible asset intensity (INTANGINT), calculated as property, plant and equipment and intangible assets, respectively, divided by total assets. These factors can be associated with both tax planning opportunities and the accounting level of tax, as shown by Davis *et al.* (2016) and Syahputri (2025). In addition, to examine possible lagged associations involving the ESG score, ESG_LAG1 is constructed only when the preceding observation belongs to the same company and refers to the immediately preceding year.

Because ETR measures can be highly sensitive to very low levels of pre-tax profit and may generate extreme values, several filters were applied to improve the stability of the analysis and reduce the influence of observations driven by very small denominators (Hanlon & Heitzman, 2010). The final sample includes observations from the 2013-2024 period and only firms with positive total assets and pre-tax profit of at least 1,000 monetary units. In addition, GAAP_ETR values were restricted to the interval between −1 and 2, following the approach commonly adopted in the literature. Finally, only observations with complete information for the dependent variable, ESG score, and all control variables were included in the estimated models.

The analysis used linear mixed models, which properly handle the panel data structure and the unbalanced number of observations available for each company. The main model includes a random intercept at the firm level in order to capture persistent unobserved differences between companies. In addition, fixed effects for country and year are introduced to control for institutional differences and common shocks over time, which is essential in cross-country analyses (Binhadab, 2025; Syahputri, 2025). A residual covariance structure is also included to account for the fact that observations referring to the same company in adjacent years may be correlated.

The main model is:

$$Tax_\text{Outcome} = \beta_0 + \beta_1 ESG_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 ROA_{i,t} + \beta_4 LEV_{i,t} + \beta_5 CAPINT_{i,t} + \beta_6 INTANGINT_{i,t} + \gamma_c + \delta_t + u_i + \varepsilon_{i,t}$$

Where Tax_Outcome is alternatively represented by Tax_Dev and GAAP_ETR, and are country/year fixed effects, is the random intercept at the firm level, and follows AR(1) over time.

The autoregressive AR(1) structure was selected after comparing it with two alternative residual covariance structures, namely scaled identity/diagonal and compound symmetry. To ensure comparability, the same dependent variable, fixed

effects, control variables, firm-level random intercept, sample, and estimation method were used in all specifications. Model fit was evaluated using the −2 restricted log likelihood, the Akaike information criterion (AIC), and the Schwarz Bayesian information criterion (BIC), for which lower values indicate a better fit. As shown in Table 1, AR(1) generated substantially lower information criteria for both Tax_Dev and GAAP_ETR and was therefore used in the final models.

Table 1. Comparison of alternative residual covariance structures

Dependent Variable	Covariance structure	-2 Restricted LL	AIC	BIC
Tax _Dev	Scaled Identity/diagonal	-3774.361	-3770.361	-3756.659
Tax _Dev	Compound symmetry	-3774.361	-3768.361	-3747.808
Tax _Dev	AR(1)	-3971.127	-3965.127	-3944.574
GAAP_ETR	Scaled Identity/diagonal	-3877.570	-3873.570	-3859.868
GAAP_ETR	Compound symmetry	-3877.570	-3871.570	-3851.017
GAAP_ETR	AR(1)	-4063.859	-4057.859	-4037.307

Source: Authors' processing using SPSS

The covariance parameters provide additional support for the selected specification. In the Tax_Dev model, the AR(1) coefficient is positive and statistically significant ($\rho = 0.271$; $p < 0.001$), indicating moderate persistence between consecutive firm-year observations. The firm-level random-intercept variance is also statistically significant (0.005606; $p < 0.001$), confirming the existence of persistent differences between companies. Similar results are obtained for GAAP_ETR, where the AR(1) coefficient is 0.265 ($p < 0.001$) and the random-intercept variance is 0.005781 ($p < 0.001$).

The robustness of the results is checked using several complementary specifications. First, both Tax_Dev and GAAP_ETR are used as dependent variables. Second, the current ESG score is replaced by its one-year lag in order to examine whether associations involving prior-year ESG values are observable in the following period, without implying causality. Third, the ESG score is mean-centered and interacted with the country factor to determine whether the absence of a significant average coefficient conceals different national patterns. Since the country samples are uneven, the interaction is also estimated for a supplementary sample that retains only countries with at least 50 firm-year observations and at least 10 distinct companies. This sample includes 15 countries, 6,889 observations, and 1,068 companies. Statistical significance is assessed using standard thresholds in the literature (1%, 5%, and 10%).

As an additional analysis, several alternative ways of grouping countries were explored to better understand the cross-country differences identified in the previous models. First, countries were classified according to their combined statutory corporate income tax rates, initially using three tax-rate groups and later a simpler classification into low- and high-tax jurisdictions. We also examined whether the results differed when countries were grouped by geographical region, similarities in their legal and fiscal systems, or by the evolution of statutory corporate income tax rates over the analysed period, distinguishing between countries with decreasing tax rates and those with stable or increasing rates. The same linear mixed-model specification and control variables were retained throughout these additional analyses to ensure comparability of the results.

The empirical analysis is structured around five analytical dimensions derived from the research question and prior literature:

- the association between current ESG scores and corporate tax outcomes in the European Union, measured by GAAP_ETR and Tax_Dev;
- the association between prior-year ESG scores and corporate tax outcomes, examined through the ESG_LAG1 variable;
- the role of institutional and temporal context, captured through country and year fixed effects;
- the possible variation of the ESG–tax outcome association across countries, examined through the Country × ESG interaction;
- the association between firm-level financial characteristics, especially profitability, leverage, and intangible asset intensity, and corporate tax outcomes.

4. Results and discussions

Before estimating the models, descriptive checks and diagnostic tests were performed. The distributions of the main variables were analyzed graphically, and cross-country heterogeneity was assessed through comparisons of means and confidence intervals. Multicollinearity tests indicate low VIF values, suggesting the absence of significant issues. In addition, the residual covariance structure was selected by comparing scaled identity/diagonal, compound symmetry, and AR(1) specifications using the −2 restricted log likelihood, AIC, and BIC. The results presented in Table 1 clearly support the AR(1) structure for both tax outcomes. The significant autoregressive and random-intercept parameters further indicate moderate temporal persistence and persistent differences across firms.

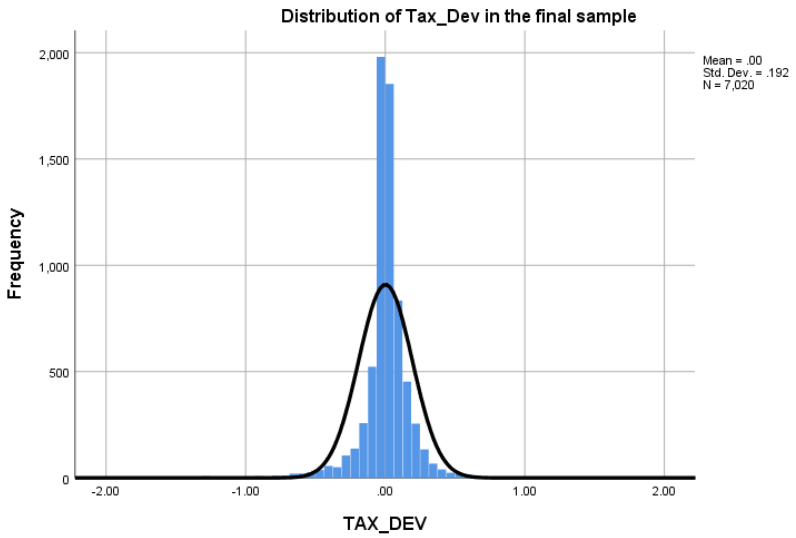


Figure 1. Distribution of the Tax_Dev in the final sample
Source: Authors' processing using SPSS

The distribution of the Tax_Dev variable in the final sample (N = 7,020) is centered close to zero, with a mean of approximately 0.002 and a standard deviation of approximately 0.192. This suggests that, on average, the difference between the combined statutory corporate income tax rate and the GAAP effective tax rate is relatively small. However, the minimum and maximum values indicate that more pronounced deviations remain present even after applying the initial filters.

This pattern is consistent with the existing literature (Hanlon & Heitzman, 2010), which highlights the limitations of ETR as a proxy for corporate tax outcomes. More specifically, ETR captures only partially its discretionary component and may be influenced by factors such as the volatility of accounting profit or non-recurring items. For this reason, the use of appropriate filters and control variables becomes essential for a correct interpretation of the results.

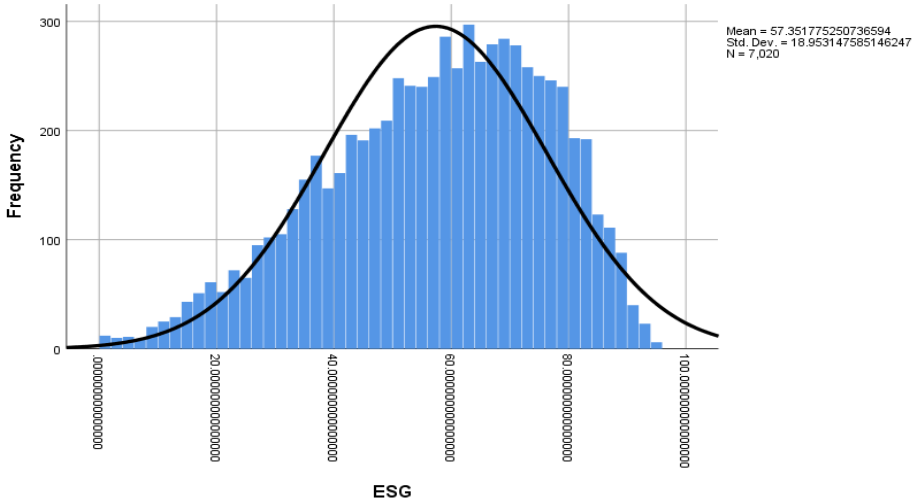


Figure 2. Distribution of the ESG score
Source: Authors' processing using SPSS

The distribution of the ESG score (mean approx. 57.35; standard deviation approx. 18.95) indicates sufficient variation within the sample, allowing for the empirical examination of the association between ESG disclosure/performance and firms' tax outcomes (El Ghoul *et al.*, 2026; Mitroulia *et al.*, 2025).

At the same time, this variability is also important for interpreting the results, as the literature shows that ESG may reflect both actual performance and the reporting dimension. Moreover, CSR/ESG disclosure may also be used as a legitimization mechanism in the context of more aggressive tax practices (Lanis & Richardson, 2012). Under these conditions, the association between ESG and tax outcomes is not necessarily linear or uniform and may even be insignificant at the aggregate level (Kovermann & Velte, 2021).

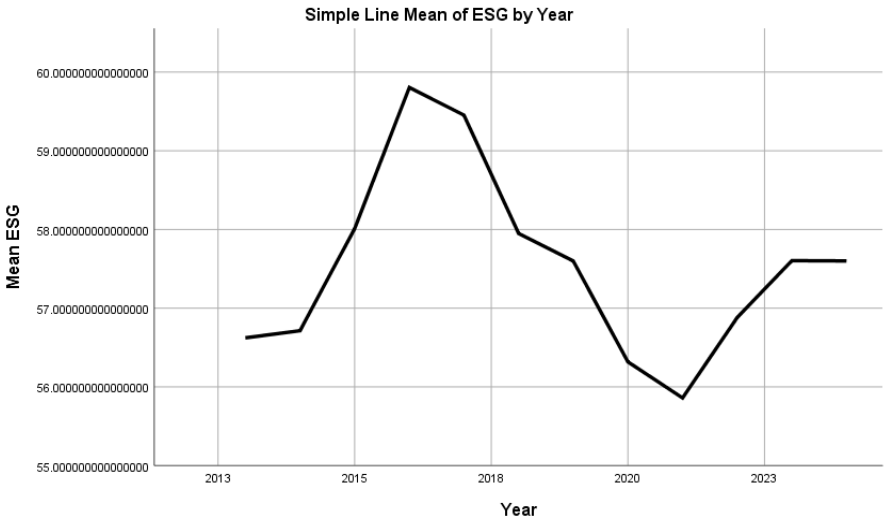


Figure 3. The evolution of the annual average for ESG score
Source: Authors' processing using SPSS

In the case of the ESG score, variations over time can be observed, with higher levels around 2016–2017, followed by a decline until 2020–2021 and then a recovery in 2023–2024. These fluctuations are consistent with the recent literature, which shows that ESG scores are associated both with changes in reporting practices and with pressures from stakeholders (El Ghoul *et al.*, 2026; Mitroulia *et al.*, 2025).

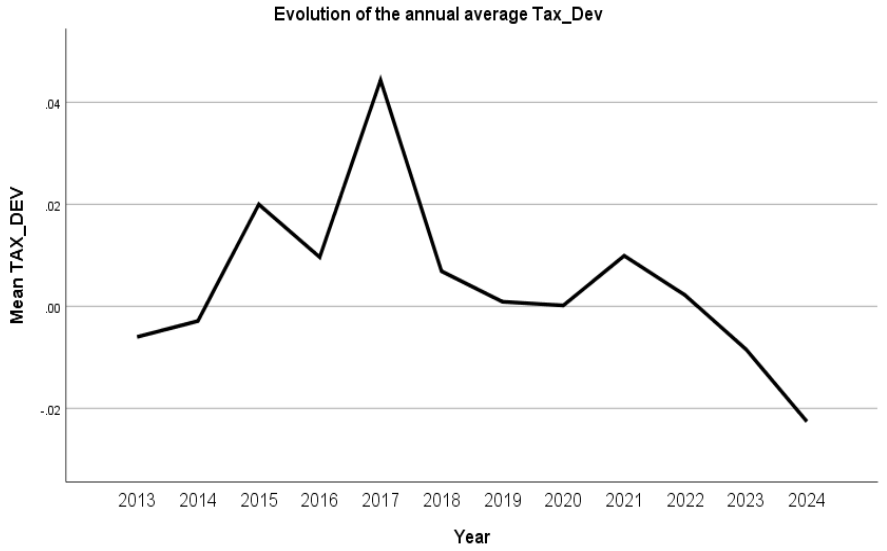


Figure 4. The evolution of the annual average for Tax_Dev
Source: Authors' processing using SPSS

The annual averages of Tax_Dev also vary throughout the analyzed period. From a methodological perspective, these time variations support the inclusion of year fixed effects, while the econometric results confirm that the year effects are jointly significant in all estimated specifications.

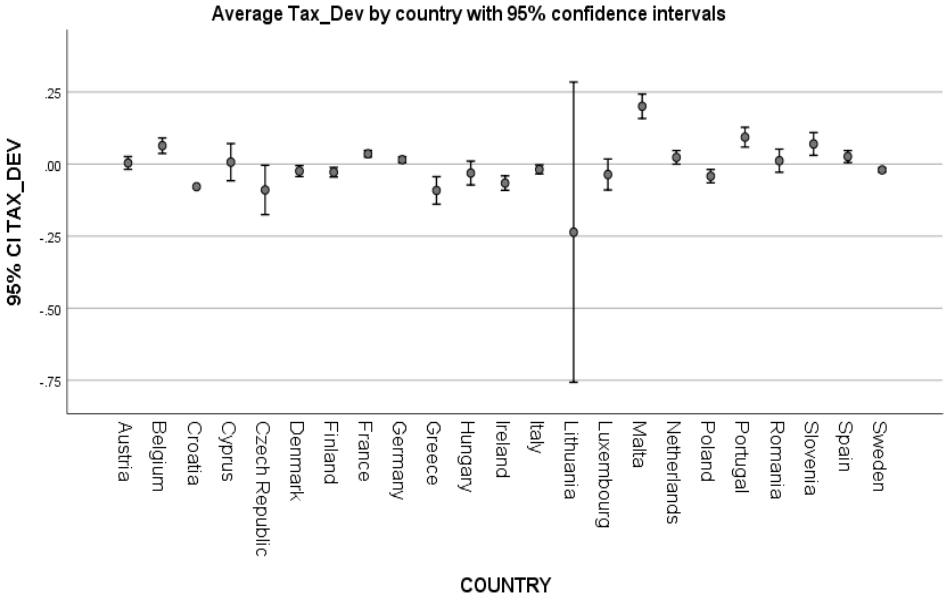


Figure 5. Average Tax_Dev by country with 95% error bars
Source: Authors' processing using SPSS

Figure 5 presents the average values of the Tax_Dev variable by country together with their 95% confidence intervals. Positive values indicate that the GAAP effective tax rate is, on average, below the statutory corporate income tax rate, whereas negative values indicate an effective tax rate above the statutory rate.

Although the average Tax_Dev values are generally close to zero, some countries show more pronounced deviations. The confidence intervals also vary in width across countries, reflecting differences in sample size and the variability of the underlying observations. Lithuania represents a notable case, as it records a considerably more negative average Tax_Dev and a much wider confidence interval than the other countries. However, this result should be interpreted with caution, since the Lithuanian subsample contains only five firm-year observations, all referring to the same company. Moreover, two observations, corresponding to 2020 and 2021, report GAAP effective tax rates substantially above the 15% statutory rate, which pulls the country average downwards. By contrast, the values recorded between 2022 and 2024 are much closer to zero. Therefore, the pattern observed for Lithuania is more likely to reflect the limited number of observations and the

influence of a small number of unusual firm-year values than a general country-level tax pattern. The available data does not allow the exact accounting reasons behind these high effective tax rates to be identified.

The descriptive results are consistent with the econometric findings. The country fixed effects are highly significant, suggesting that the institutional environment plays an important role in explaining differences in tax outcomes across EU countries. This interpretation is also consistent with previous cross-country studies examining the relationship between ESG and corporate tax outcomes (Binhadab, 2025; Syahputri, 2025).

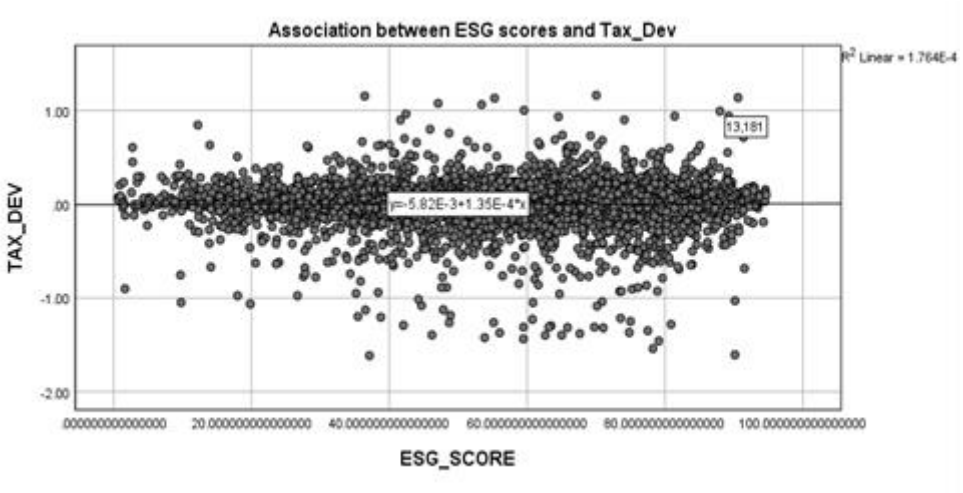


Figure 6. The scatter plot between ESG and Tax_Dev
Source: Authors' processing using SPSS

The association between ESG and Tax_Dev, analyzed through a scatter plot together with the regression line, suggests a very weak link between the two variables at the raw level. The slope is close to zero, indicating that the average bivariate relationship does not provide clear evidence of an association.

This observation is consistent with the results obtained from the panel models, where ESG does not appear statistically significant once country, year, firm-level financial characteristics, unobserved firm heterogeneity, and temporal dependence are controlled for. From a theoretical perspective, the literature suggests that ESG may be associated with corporate tax outcomes through several organizational mechanisms (Jiang *et al.*, 2024). However, these associations are often better captured by other indicators, such as BTD or DDBTD, rather than ETR. Additionally, the literature frequently refers to single-country analyses, where external influences are better controlled and the relationship between the two variables tends to be more persistent.

Table 2. Descriptive statistics of the variables Tax_Dev and ESG

Variable	N	Min	Max	Mean	Dev. Std.
Tax_Dev	7.020	-1,62	1,16	0.0019	0,19246
GAAP_ETR	7.020	-0.94	1.91	0.2552	0.19103
ESG	7.020	0,6267	94,7110	57,3518	18,9531

Source: Authors' processing using SPSS

Table 2 shows that the Tax_Dev variable includes 7,020 observations, with values ranging between −1.62 and 1.16, a mean of 0.0019, and a standard deviation of 0.19246. The mean, which is very close to zero, suggests that the GAAP effective tax rate is, on average, close to the combined statutory rate. At the same time, the difference between the minimum and maximum values indicates the presence of variation across firms, with some recording more pronounced deviations.

Table 3. Statistical significance of the variables in the estimated models

Variable	Tax_Dev current β (p)	GAAP_ETR current β (p)	Tax_Dev ESG_LAG1 β (p)	Tax_Dev ESG_LAG1 β (p)
ESG/ESG_LAG1	−0.000021 (0.922)	0.000039 (0.859)	−0.000197 (0.387)	0.000202 (0.372)
SIZE	−0.000525 (0.852)	0.000217 (0.938)	0.002947 (0.320)	−0.003210 (0.277)
ROA	0.120330 (0.010)**	−0.116647 (0.012)**	0.137205 (0.008)***	−0.134934 (0.008)***
LEV	−0.069863 (0.002)***	0.071527 (0.001)***	−0.061699 (0.009)***	0.063472 (0.007)***
CAPINT	−0.008602 (0.671)	0.007128 (0.724)	0.000441 (0.983)	−0.002343 (0.911)
INTANGINT	0.060119 (0.070)*	−0.055029 (0.096)*	0.078036 (0.024)**	−0.071797 (0.037)**
Year FE	0,000***	0,000***	0,000***	0,001***
Country FE	0,000***	0,000***	0,000***	0,000***
N	7,020	7,020	6,129	6,129

Note: All models include a firm-level random intercept, country and year fixed effects, and an AR(1) residual structure.

Source: Authors' processing using SPSS

GAAP_ETR also includes 7,020 observations, with an average of 0.2552 and a standard deviation of 0.19103. For the ESG variable, values range between 0.6267 and 94.7110, with a mean of 57.3518 and a standard deviation of 18.9531. This indicates that the sample is diverse, including firms with different levels of ESG disclosure/performance, and provides sufficient variation for examining its association with the fiscal indicators.

Table 3 reports the results of the main models. When Tax_Dev is used as the dependent variable, the ESG score is not statistically significant ($\beta = -0.000021$; $p = 0.922$). The coefficient is very close to zero, and the confidence interval includes zero, suggesting that there is no statistically significant average association between ESG and Tax_Dev after controlling for firm-level financial characteristics, country and year effects, unobserved firm heterogeneity, and temporal dependence. A similar result is obtained when GAAP_ETR is used as the dependent variable ($\beta = 0.000039$; $p = 0.859$). This indicates that the main conclusion is not affected by the choice of the tax outcome measure.

The lagged models were used to examine whether prior-year ESG performance is associated with current tax outcomes. The results remain similar. ESG_LAG1 is not statistically significant in either the Tax_Dev model ($\beta = -0.000197$; $p = 0.387$) or the GAAP_ETR model ($\beta = 0.000202$; $p = 0.372$). Therefore, the findings do not provide evidence of a common EU-level association between ESG and tax outcomes, either in the same year or with a one-year lag.

In contrast, some of the financial variables remain relevant across the four specifications. Profitability, measured by ROA, and leverage are statistically significant in all models. ROA is positively associated with Tax_Dev and negatively associated with GAAP_ETR, while leverage shows the opposite pattern. These opposite signs are expected, since Tax_Dev is calculated as the difference between the statutory corporate income tax rate and GAAP_ETR. The intensity of intangible assets is marginally significant in the current-year models and significant at the 5% level in the lagged models. The size (SIZE) and capital intensity (CAPINT), however, remain statistically insignificant. The country and year fixed effects are jointly significant in all specifications.

As an additional check, the ESG–tax outcome relationship was also examined using OLS regression. This analysis was mainly used for diagnostic purposes, including the assessment of multicollinearity through VIF and tolerance values, and to observe the relationship between the variables before accounting for the panel structure of the data. Under the OLS specification, ESG appears statistically significant. However, this result is no longer observed in the mixed models, which control for country and year effects, include a firm-level random intercept, and account for temporal dependence through an AR(1) structure. This difference suggests that the OLS coefficient may partly capture variation related to the institutional environment, changes over time, or persistent differences between firms. Once these sources of variation are taken into account, the ESG coefficient is no longer statistically significant. For this reason, the mixed-model results provide the more appropriate basis for interpretation in this study.

However, the absence of a significant average ESG coefficient does not necessarily imply that the relationship between ESG performance and tax outcomes is consistent across countries. To explore potential cross-country differences, we extended the analysis by introducing an interaction between ESG and Country. This approach is consistent with previous cross-country sustainability research, such as Cajias *et al.* (2012), who interacted CSR measures with country dummy variables to examine whether the relationship varied across national contexts. In our analysis, Country refers to the country in which each company is incorporated, with each firm-year observation assigned to the corresponding registered jurisdiction. The variable was treated as a nominal categorical factor in SPSS, allowing the ESG–tax relationship to vary across countries rather than assuming a common association for the entire sample. To investigate whether the association between ESG performance and corporate tax outcomes differs across national contexts, ESG was first mean-centered and subsequently interacted with the Country factor. The resulting Country × ESG term therefore captures cross-country heterogeneity in the slope of ESG rather than differences in the average level of taxation between countries.

As shown in Table 4, the Country × ESG interaction is statistically significant in the full sample for both Tax_Dev (F = 2.162; p = 0.002) and GAAP_ETR (F = 2.024; p = 0.004). This suggests that the overall ESG coefficient may hide important differences across countries, with the association varying in direction or strength depending on the national context.

Table 4. Test of the Country × ESG interaction

Dependent variable	Full sample (F statistic)	Full sample (p-value)	Additional sample (F statistic)	Additional sample (p-value)
Tax_Dev	2,162	0.002***	1.780	0.036**
GAAP_ETR	2,024	0.004***	1.558	0.084*

Note: The full sample contains 7,020 observations. The additional sample contains 15 countries with at least 50 firm-year observations and at least 10 distinct firms (N = 6,889; 1,068 firms).

Source: Authors' processing using SPSS

Because the number of observations and firms varies considerably across countries, the interaction analysis was repeated using a restricted sample that included only countries with at least 50 firm-year observations and a minimum of 10 distinct firms. The results remained broadly consistent. The Country × ESG interaction continued to be statistically significant for Tax_Dev (p = 0.036), while for GAAP_ETR it remained significant at the 10% level (p = 0.084). These findings suggest that the evidence of cross-country differences is more robust when tax outcomes are measured as deviations from the statutory corporate income tax rate than when the effective tax rate is analysed directly.

To better understand these cross-country differences, several additional country classifications were explored. Countries were first grouped according to their combined statutory corporate income tax rates, using both a three-group classification (low, medium, and high-tax jurisdictions) and a simpler distinction between low and high-tax countries. Additional analyses were then carried out by grouping countries according to geographical region, similarities in their legal and fiscal systems, and the evolution of statutory corporate income tax rates over the analysed period, distinguishing between countries with decreasing tax rates and those with stable or increasing rates. None of these alternative classifications resulted in a statistically significant association between ESG scores and either of the tax outcome measures.

Overall, these findings suggest that the differences identified across countries cannot be explained by a single broad characteristic, such as geographical location, the level or evolution of the statutory corporate income tax rate, or similarities in legal and fiscal systems. Instead, they are likely to reflect a combination of country-specific institutional, regulatory, accounting, economic, and firm-level factors. For this reason, these additional classifications were considered exploratory analyses and were not included in the final empirical models.

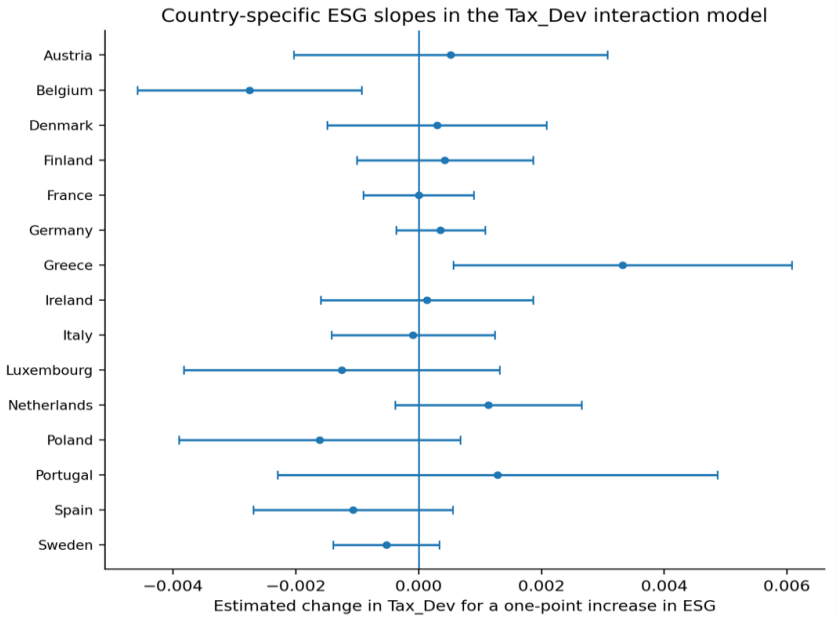


Figure 7. Country-specific ESG coefficients in the Tax_Dev interaction model

Note: The figure presents estimates and 95% confidence intervals for the 15 countries that meet the minimum representation criterion. The coefficients are obtained from the full-sample interaction model and are presented for descriptive and exploratory purposes.

Source: Authors' processing using Excel

Figure 7 shows that the estimated ESG coefficients differ across the countries included in the analysis, both in terms of direction and magnitude. Belgium has a negative coefficient that is nominally significant, while Greece has a positive coefficient that is also nominally significant. However, for most countries, the confidence intervals include zero. These individual estimates should therefore be interpreted with caution, particularly because several country-level comparisons are made at the same time. The more relevant result is the overall interaction test, which shows that the country-specific ESG slopes are not jointly equal.

Overall, the findings do not support the existence of a uniform association between ESG scores and ETR-based tax outcomes at EU level. At the same time, the interaction results suggest that the relationship may differ across national contexts. This helps explain why the average ESG coefficient is not significant, even though country-level differences remain important. It may also help account for the different conclusions reached by previous studies focusing on individual jurisdictions.

These results also support a cautious interpretation of ESG scores in tax-related research. ESG is a broad measure that combines several dimensions of non-financial performance and disclosure, whereas GAAP_ETR and Tax_Dev are influenced by a wide range of factors, including profitability, financing structure, accounting rules, tax incentives, and non-recurring items. In this context, the consistent significance of profitability, leverage, country, and year effects suggests that both firm-level financial characteristics and the wider institutional and temporal environment remain important in explaining differences in corporate tax outcomes.

5. Conclusions

This study examined the relationship between ESG disclosure and performance and corporate tax outcomes in the European Union. ESG was measured using the Refinitiv ESG score, while corporate tax outcomes were captured through GAAP_ETR and Tax_Dev. The analysis was based on panel data for companies from 23 EU Member States over the period 2013–2024.

The results of the panel models do not provide evidence of a statistically significant association between ESG scores and the two tax measures used in the study. This conclusion remains unchanged in the models that include lagged ESG values. In other words, after controlling for firm-level financial characteristics, country and year effects, unobserved firm heterogeneity, and temporal dependence, companies with higher ESG scores do not appear to report systematically different effective tax rates or deviations from the statutory corporate income tax rate.

At the same time, the interaction analysis shows that the lack of a significant ESG coefficient should not be interpreted as evidence that the relationship is identical

across all EU countries. The Country × ESG interaction is statistically significant for both tax outcomes in the full sample. In the restricted sample, which includes only countries with sufficient representation, the interaction remains significant for Tax_Dev and marginally significant for GAAP_ETR. These results suggest that the national context may influence the relationship between ESG and corporate tax outcomes.

This result is important for the interpretation of ESG scores in tax-related research. ESG scores provide a broad measure of non-financial disclosure and performance, but they do not necessarily offer direct information about socially responsible tax behavior. The absence of a significant average association therefore suggests that ESG scores should be used cautiously when assessing corporate fiscal responsibility, particularly when tax behavior is measured using ETR-based indicators. This interpretation is consistent with previous studies showing that the relationship between ESG or CSR and taxation depends on how the main concepts are defined, which tax measures are used, and the institutional setting in which the analysis is carried out.

By contrast, several financial and contextual variables show more consistent associations with the tax outcomes examined. Profitability and leverage are statistically significant across all estimated models, while intangible asset intensity is significant in several specifications. Country and year effects are also consistently significant. This indicates that differences between national tax and institutional systems, as well as changes over time, remain important in explaining variation in effective tax rates and deviations from statutory corporate income tax rates. Overall, the results suggest that, in a multi-country EU sample, ETR-based tax outcomes are more closely related to firm-level financial characteristics and contextual factors than to the overall ESG score.

The main contribution of this study is that it provides EU-level evidence on the relationship between ESG scores and corporate taxation using a multi-country panel framework. Unlike studies focusing on a single country or on tax-specific transparency measures, this paper shows that broad ESG scores are not necessarily aligned with ETR-based tax outcomes in a heterogeneous European setting. From an academic perspective, the findings underline the importance of distinguishing between ESG disclosure, ESG performance, and corporate tax outcomes. From a policy and practical perspective, they suggest that general sustainability indicators should be complemented by tax-specific disclosures and information on the institutional context when corporate fiscal responsibility is assessed.

Overall, the findings do not support the conclusion that higher ESG scores are systematically associated with different tax outcomes measured through the effective tax rate or the deviation from the statutory rate. Instead, the results indicate that the

relationship between ESG and taxation depends on the measures used, the institutional context, and the financial characteristics of the firms included in the analysis. Future research could build on these findings by examining individual ESG dimensions, tax-specific transparency measures, or alternative measures of corporate tax outcomes, such as book-tax differences, discretionary book-tax differences, cash ETR, or long-run cash ETR.

6. Limitations and future research

This study has several limitations that should be taken into account when interpreting the results. First, although the use of a multi-country sample increases the relevance of the analysis at EU level, it also introduces considerable institutional, fiscal, and economic differences across countries. These differences are also highlighted in the previous literature. While the models include country and year effects, it is still possible that some structural differences between jurisdictions are not fully captured and may reduce the visibility of the relationship between ESG scores and tax outcomes.

Second, corporate tax outcomes are measured using GAAP_ETR and Tax_Dev. Although these indicators are widely used in tax research, they do not capture all dimensions of corporate tax outcomes. Their values may reflect not only firms' tax practices, but also accounting treatments, temporary differences, tax incentives, and other legitimate differences between accounting and tax rules. At the same time, the use of an overall ESG score may hide important differences between the environmental, social, and governance dimensions. For this reason, the ESG score should be interpreted as a broad measure of ESG disclosure and performance rather than as a direct indicator of specific corporate tax practices or fiscal responsibility.

Future research could address some of these limitations by focusing on individual countries, where the same variables could be examined within a more homogeneous institutional and fiscal setting. In such analyses, OLS models could be used as a benchmark alongside panel models to assess whether the relationship becomes more visible when country-level differences are more limited. Further research could also use alternative tax measures, tax-specific disclosure indicators, and separate ESG components in order to provide a more detailed understanding of the relationship between ESG and corporate taxation.

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