

ESG AND TAX AVOIDANCE: THE MODERATING ROLE OF BOARD GENDER DIVERSITY IN INDONESIAN ENERGY FIRMS

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Abstract

This study examines the relationship between environmental, social, and governance (ESG) disclosure and tax avoidance and investigates the moderating role of board gender diversity among Indonesian energy firms. The study uses an unbalanced panel of 42 energy firms listed on the Indonesia Stock Exchange during 2019–2024, comprising 241 firm-year observations. ESG disclosure is measured using a 42-item disclosure index constructed through content analysis of annual, sustainability, and integrated reports. Board gender diversity is measured as the proportion of female directors relative to the total number of directors. Tax avoidance is primarily proxied by the effective tax rate (ETR), while the cash effective tax rate (CETR) is employed for robustness testing. The hypotheses are tested using pooled ordinary least squares with standard errors clustered at the firm level and year effects. The results show that broader ESG disclosure is associated with higher ETR, indicating lower tax avoidance. The interaction between ESG disclosure and board gender diversity is also positive and statistically significant, indicating that the association between ESG disclosure and lower tax avoidance becomes stronger as female representation on the board increases. The findings remain consistent when CETR is used as an alternative tax avoidance measure. These results highlight the relevance of board gender diversity in understanding the relationship between sustainability disclosure and corporate fiscal behavior.

Keywords: ESG Disclosure; Tax Avoidance; Board Gender Diversity; Energy Firms; Indonesia

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1. Introduction

The relationship between environmental, social, and governance (ESG) disclosure and corporate tax avoidance has attracted increasing attention because

sustainability commitments and tax behavior represent two important dimensions of corporate accountability. ESG disclosure communicates firms' environmental, social, and governance responsibilities to stakeholders, while corporate taxation represents an economic contribution to governments and society. However, empirical evidence does not establish a uniform relationship between ESG engagement and tax behavior. Several studies indicate that stronger ESG performance or disclosure is associated with lower tax avoidance (Peixoto et al., 2024; Rinaldi et al., 2020; Syahputri, 2025; Velte, 2023; Yoon et al., 2021), whereas other studies suggest that ESG-related activities may coexist with higher levels of tax avoidance or tax aggressiveness (Davis et al., 2016; Kim & Lee, 2025; Lee, 2024; Ma et al., 2025; Rinaldi & Ramadhani, 2023; Yanto et al., 2025; Zhang & Yuan, 2025). A recent meta-regression further documents substantial heterogeneity in the ESG-tax avoidance relationship across indicators, samples, and econometric approaches (Mitroulia et al., 2025). These contrasting findings indicate that sustainability disclosure alone may not fully explain differences in corporate tax behavior.

This issue is particularly relevant in Indonesia, where the tax-to-GDP ratio stood at approximately 12.0% in 2023, considerably below the Asia-Pacific average of approximately 19.5% (OECD, 2025). The relatively low level of tax revenue increases the importance of understanding corporate practices that may influence firms' effective tax contributions. At the same time, the implementation of sustainable finance through POJK No. 51/POJK.03/2017 has increased expectations for issuers and public companies to integrate sustainability considerations into corporate practices and reporting (Otoritas Jasa Keuangan, 2017). Consequently, firms increasingly face simultaneous expectations regarding sustainability accountability and fiscal responsibility.

The energy sector provides a particularly relevant setting for examining this relationship. Energy firms operate in an industry characterized by substantial environmental exposure, intensive natural-resource utilization, high capital requirements, commodity-price volatility, and increasing pressure associated with the energy transition. These characteristics make corporate sustainability practices and fiscal contributions particularly visible to regulators, investors, communities, and other stakeholders. At the same time, large investment requirements and volatile operating conditions may create incentives to preserve after-tax cash flows. Previous studies suggest that the relationship between ESG and corporate tax behavior can vary according to governance

arrangements, strategic orientation, and institutional or industry characteristics (Chandrasena et al., 2025; Irwansyah et al., 2023; Khairin & Firmansyah, 2025; Rinaldi et al., 2023). The Indonesian energy sector therefore provides an appropriate setting for examining whether broader sustainability disclosure corresponds with more responsible corporate tax behavior.

One explanation for the heterogeneous relationship between ESG and tax avoidance is that internal governance conditions influence how sustainability commitments are translated into corporate decisions. Recent studies increasingly integrate board characteristics into the ESG-tax relationship. Elgharbawy & Aladwey (2025), for example, show that ESG performance and several dimensions of board diversity are relevant to corporate tax avoidance, while Hossain et al. (2025) demonstrate that female board representation can condition the relationship between corporate sustainability disclosure and tax avoidance. Indonesian evidence also connects women's participation on corporate boards with ESG and tax avoidance (Sambuaga & Felicia, 2024). Nevertheless, the empirical evidence remains context-dependent. Sibuea & Afriani (2025) find no statistically significant moderating effect of female board representation on the ESG-tax avoidance relationship among ASEAN-5 manufacturing firms, while recent ASEAN evidence continues to examine board gender diversity within models linking ESG and corporate tax behavior (Mukhtaruddin et al., 2026). These differences indicate that the governance mechanism underlying the ESG-tax relationship remains unresolved and warrants examination in more specific institutional and industrial settings.

Board gender diversity is particularly relevant because it captures the extent to which women participate in corporate decision-making. Rather than focusing only on whether at least one female director is present, board gender diversity can be measured by the proportion of female directors relative to the total number of directors. This proportional measure captures the intensity of female representation within the board and therefore provides more information than a simple presence-based indicator. Alkhawaja et al. (2023) provide global evidence that greater board gender diversity is positively associated with ESG disclosure, while Odriozola et al. (2024) report significant relationships between board gender diversity and several dimensions of ESG performance in European firms. More directly in the taxation context, Gaio et al. (2026) measure board gender diversity using the percentage of women on boards and find that greater female representation is associated with lower corporate tax aggressiveness.

Together, these findings suggest that the degree of female participation in corporate boards may be relevant for understanding both sustainability and fiscal decisions.

Stakeholder theory provides the theoretical foundation for explaining this relationship. Contemporary stakeholder theory emphasizes that firms operate through relationships with multiple parties whose interests extend beyond shareholders and encompass employees, creditors, regulators, communities, and society (Freeman, 1984). From this perspective, ESG disclosure increases the visibility of corporate commitments to stakeholders and may create expectations that these commitments are reflected consistently across other corporate decisions. Tax behavior represents one such decision because corporate taxation constitutes part of firms' economic contribution to society. Aggressive tax avoidance may therefore create tension between sustainability responsibilities communicated through ESG disclosure and the broader accountability expected by stakeholders

Based on this perspective, broader ESG disclosure is expected to be associated with lower tax avoidance. Greater disclosure makes firms' sustainability commitments more visible and may increase reputational and accountability pressures to maintain consistency between sustainability reporting and fiscal behavior. Empirical evidence from different institutional settings supports this argument. Yoon et al. (2021), Velte (2023), Peixoto et al. (2024), Syahputri (2025), and Khairin & Firmansyah (2025) report evidence consistent with a negative relationship between sustainability-related practices and tax avoidance. Although opposing findings remain in the literature, stakeholder theory provides a basis for expecting broader ESG disclosure to be accompanied by less aggressive tax behavior.

H1: ESG disclosure is negatively associated with tax avoidance

The strength of this relationship may depend on board gender diversity. A greater proportion of female directors may broaden the perspectives incorporated into strategic decision-making and increase attention to stakeholder interests, reputational consequences, and accountability considerations. Previous evidence associates female board representation with lower tax aggressiveness and stronger responsibility-oriented corporate behavior (Dakhli, 2022; Jarboui et al., 2020; Lanis et al., 2017; Riguen et al., 2020; Sandag et al., 2022). More recent studies reinforce this argument by showing that greater female representation is

associated with broader ESG disclosure or stronger ESG performance (Alkhawaja et al., 2023; Odriozola et al., 2024) and with lower corporate tax aggressiveness (Gaio et al., 2026). Therefore, greater gender diversity on the board may increase the likelihood that sustainability commitments communicated through ESG disclosure are accompanied by fiscal behavior consistent with those commitments

H2: The negative association between ESG disclosure and tax avoidance is stronger at higher levels of board gender diversity

Despite the growing literature, three related gaps remain. First, empirical evidence on the relationship between ESG and tax avoidance continues to be heterogeneous, indicating that governance conditions may help explain why similar levels of sustainability engagement are associated with different tax outcomes. Second, recent studies have begun to examine ESG, female board representation, and tax avoidance jointly, but the available evidence is drawn predominantly from developed markets, Malaysia, broad ASEAN samples, manufacturing firms, or cross-sector non-financial firms (Elgharbawy & Aladwey, 2025; Hossain et al., 2025; Mukhtaruddin et al., 2026; Oktafiani et al., 2023; Rinaldi et al., 2025; Sibuea & Afriani, 2025). Evidence specifically concerning Indonesian energy firms remains limited. Third, prior research employs different measures of female participation, ranging from presence and gender quotas to proportional representation. This leaves an important empirical question regarding whether the intensity of female representation, measured continuously as the proportion of female directors, changes the relationship between ESG disclosure and tax avoidance in an industry characterized by particularly high sustainability and fiscal visibility.

Accordingly, this study examines whether ESG disclosure is associated with tax avoidance among Indonesian energy firms and whether board gender diversity moderates this relationship. The study contributes to the literature in three respects. First, it provides sector-specific evidence from Indonesian energy firms, where environmental responsibility, fiscal contribution, and stakeholder scrutiny are closely interconnected. Second, it distinguishes the intensity of female representation from the mere presence of female directors by operationalizing board gender diversity as the proportion of women on the board. Third, it extends the application of stakeholder theory by examining ESG disclosure, board gender diversity, and corporate tax behavior within a single empirical framework. This approach provides a more differentiated assessment

of the governance conditions under which sustainability disclosure is associated with corporate fiscal behavior.

2. Research Method

2.1 Research Design and Data

This study employs a quantitative research design using secondary panel data from energy sector firms listed on the Indonesia Stock Exchange (IDX) during the 2019–2024 period. The data were manually collected from annual reports, sustainability reports, and integrated reports obtained from company websites and the IDX. The sample was selected using purposive sampling based on the availability of financial, tax, ESG disclosure, and board composition information required to construct the research variables.

The analytical sample was restricted to firm-year observations with positive pretax income because both ETR and CETR use pretax income as the denominator. Zero or negative pretax income may generate economically difficult-to-interpret effective tax rates and therefore does not provide a comparable measure of firms' effective tax burden. Accordingly, all 241 firm-year observations included in the final analytical sample report positive pretax income. The study retains an unbalanced panel structure so that all firm-year observations satisfying the research criteria can be included. This restriction improves comparability in the measurement of ETR and CETR, although it also means that the findings primarily represent profitable firm-year observations and should not be directly generalized to firms reporting zero or negative pretax income.

2.2 Variable Measurement

Tax Avoidance

Tax avoidance is primarily measured using the effective tax rate (ETR), calculated as income tax expense divided by pretax income. A lower ETR indicates a lower effective tax burden and therefore a higher level of tax avoidance, whereas a higher ETR indicates lower tax avoidance (Drake et al., 2020).

To assess the robustness of the main results, this study employs the cash effective tax rate (CETR) as an alternative measure of tax avoidance. CETR is

calculated as cash taxes paid divided by pretax income and captures firms' actual cash tax payments relative to pretax income (Thomsen & Watrin, 2018). Accordingly, ETR and CETR are inversely related to tax avoidance. Therefore, a positive coefficient indicates an association with a higher effective tax rate and, consequently, lower tax avoidance, whereas a negative coefficient indicates the opposite. This interpretation is applied consistently throughout the empirical analysis.

ESG Disclosure

The main independent variable is ESG disclosure, measured using a GRI-based ESG Disclosure Index constructed through content analysis of firms' annual reports, sustainability reports, and integrated reports. The measurement adapts disclosure-based approaches used by Husada & Handayani (2021) and Khairin and Firmansyah (2025) and is aligned with relevant GRI Standards.

The ESG Disclosure Index consists of 42 disclosure items, comprising 12 environmental items, 15 social items, and 15 governance items. Each item is coded using a binary scoring approach, where a value of 1 is assigned when the relevant information is disclosed and 0 when it is not disclosed. All items are assigned equal weights because the index is intended to capture the breadth of ESG disclosure across the three dimensions. Accordingly, each disclosed item contributes equally to the overall ESG disclosure score. The ESG disclosure score is calculated as follows:

$$ESG = \frac{\text{Number of ESG items disclosed}}{42} \times 100$$

The environmental dimension covers areas such as materials, energy, water, emissions, waste, and environmental supplier assessment. The social dimension includes employment, occupational health and safety, training, diversity, human rights, community engagement, supplier assessment, and customer privacy. The governance dimension includes governance structures, oversight, remuneration, conflicts of interest, ethics, anti-corruption, and regulatory compliance (Global Reporting Initiative, 2016, 2018, 2020, 2021).

Board Gender Diversity

Board gender diversity (BOD) is employed as the moderating variable and is measured as the proportion of female members of the Board of Directors

relative to the total number of directors. In the Indonesian corporate governance structure, this measure refers specifically to the Board of Directors and does not include members of the Board of Commissioners. The variable is calculated as follows:

$$\text{BOD} = \frac{\text{Number of female directors}}{\text{Total number of directors}} \times 100$$

This proportional measure captures the degree of female representation in the Board of Directors rather than merely identifying whether at least one female director is present. The use of a proportional measure is consistent with recent studies that operationalize board gender diversity through the percentage or proportion of women serving on corporate boards (Alkhawaja et al., 2023; Gaio et al., 2026).

This distinction is particularly relevant to the present study because the objective is to determine whether variation in the intensity of female participation in corporate decision-making changes the relationship between ESG disclosure and tax avoidance. For the moderation analysis, ESG disclosure and board gender diversity were mean-centered by subtracting their respective sample means before constructing the $\text{ESG} \times \text{BOD}$ interaction term. The centered ESG and BOD variables were subsequently used in the regression models and reported in the descriptive statistics. For simplicity, the centered variables are denoted as ESG and BOD throughout the empirical analysis.

Control Variables

The study includes five firm-level control variables that may influence corporate tax outcomes: firm size, profitability, leverage, capital intensity, and inventory intensity. These variables follow (Fernández-Rodríguez et al., 2019).

Table 1. Control Variable Measurement

Variable	Symbol	Measurement
Firm Size	SIZE	Natural logarithm of total assets
Profitability	ROA	Net income / Total assets
Leverage	LEV	Total liabilities / Total assets
Capital Intensity	CAPINT	Net property, plant, and equipment / Total assets
Inventory Intensity	INVINT	Inventory / Total assets

Source: Research Data, 2026

2.3 Empirical Model

This study employs three regression specifications to examine the relationship between ESG disclosure and tax avoidance and the moderating role of board gender diversity. The models are estimated using Pooled Ordinary Least Squares (Pooled OLS) with standard errors clustered at the firm level.

The use of pooled OLS was further assessed against firm fixed-effects specifications. A joint test of firm-specific effects does not reject the null hypothesis that the firm effects are jointly insignificant ($F = 0.898$, $p = 0.650$). The estimated firm-level variance under a random-intercept specification is also negligible. These diagnostics indicate limited unobserved time-invariant firm heterogeneity in the analytical sample. Accordingly, pooled OLS with firm-level clustered standard errors and year effects is retained as the primary specification. Firm fixed-effects estimation is additionally employed as a robustness check.

Model 1 examines the relationship between ESG disclosure and tax avoidance after controlling for firm characteristics:

$$ETR_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 SIZE_{it} + \beta_3 ROA_{it} + \beta_4 LEV_{it} + \beta_5 CAPINT_{it} + \beta_6 INVINT_{it} + \lambda_t + \varepsilon_{it}$$

Model 2 introduces board gender diversity to examine its role before the interaction term is included:

$$ETR_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 BOD_{it} + \beta_3 SIZE_{it} + \beta_4 ROA_{it} + \beta_5 LEV_{it} + \beta_6 CAPINT_{it} + \beta_7 INVINT_{it} + \lambda_t + \varepsilon_{it}$$

Model 3 constitutes the main moderation model and incorporates the interaction between ESG disclosure and board gender diversity:

$$ETR_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 BOD_{it} + \beta_3 (ESG_{it} \times BOD_{it}) + \beta_4 SIZE_{it} + \beta_5 ROA_{it} + \beta_6 LEV_{it} + \beta_7 CAPINT_{it} + \beta_8 INVINT_{it} + \lambda_t + \varepsilon_{it}$$

where i denotes the firm, t denotes the year, λ_t represents year effects, and ε_{it} represents the error term. H1 is evaluated based on the coefficient of ESG disclosure, while H2 is evaluated based on the interaction coefficient between ESG and BOD in Model 3.

Because ETR is inversely related to tax avoidance, the regression coefficients are interpreted first in relation to ETR and subsequently in relation to the underlying tax-avoidance construct. A positive coefficient on ESG

indicates that broader ESG disclosure is associated with higher ETR and, consequently, lower tax avoidance. Similarly, a positive and statistically significant $ESG \times BOD$ coefficient indicates that the positive association between ESG disclosure and ETR becomes stronger at higher levels of board gender diversity, corresponding to a stronger negative association between ESG disclosure and tax avoidance.

2.4 Robustness Test

To evaluate whether the main findings are sensitive to the measurement of tax avoidance, the full moderation specification is re-estimated using CETR as an alternative dependent variable. CETR captures actual cash tax payments relative to pretax income and therefore provides a complementary measure to the accounting-based ETR. In addition, Model 3 is re-estimated using firm fixed effects and year effects as an additional panel-data robustness check.

The robustness of the findings is evaluated based on the consistency in the direction and statistical significance of the ESG and $ESG \times BOD$ coefficients across the alternative CETR specification and the firm fixed-effects specification. Consistent results across these estimations provide evidence that the main findings are not driven solely by the choice of tax avoidance proxy or by time-invariant firm-specific characteristics.

3. Result and Discussion

3.1 Result

Descriptive Statistics

Table 2 presents the descriptive statistics for the variables used in the empirical analysis. The final sample consists of 241 firm-year observations from Indonesian energy firms during 2019–2024. ETR has a mean of 0.218 and a standard deviation of 0.036, indicating an average effective tax burden of approximately 21.8% of pretax income. The mean-centered ESG and board gender diversity (BOD) variables have means of approximately zero, with standard deviations of 2.555 and 11.377, respectively. The $ESG \times BOD$ interaction term has a mean of 15.356 and a standard deviation of 31.394, indicating substantial variation in the moderating variable.

The control variables also exhibit variation across the sample. SIZE has a mean of 22.489, ROA averages 0.124, and LEV has a mean of 0.503. Meanwhile, INVINT and CAPINT have mean values of 0.057 and 0.201, respectively. Overall, the descriptive statistics indicate sufficient variation in the variables used in the subsequent regression analysis.

Table 2. Descriptive Statistics

Variables	Obs.	Mean	Std. Dev.	Min.	Max.
ETR	241	0.218	0.036	0.130	0.355
ESG	241	0.000	2.555	-7.397	5.673
BOD	241	0.000	11.377	-19.822	30.178
ESG × BOD	241	15.356	31.394	-40.49	160.324
SIZE	241	22.489	4.256	12.284	31.701
ROA	241	0.124	0.188	0.000	2.156
INVINT	241	0.057	0.081	0.000	0.575
LEV	241	0.503	0.221	0.104	0.980
CAPINT	241	0.201	0.184	0.000	0.859

Source: Research Data, 2026

Correlation and Multicollinearity Diagnostics

Table 3 presents the correlation matrix and variance inflation factor (VIF) values for the explanatory variables. The correlations are generally low to moderate. The highest correlation is observed between ESG disclosure and board gender diversity at 0.531. The correlations between the ESG × BOD interaction term and ESG and BOD are -0.053 and 0.115, respectively. Correlations among the remaining explanatory variables are relatively low, with none approaching levels commonly associated with serious multicollinearity.

The VIF results provide further evidence that multicollinearity is not a concern. VIF values range from 1.049 to 1.515, with a mean VIF of 1.179. BOD has the highest VIF at 1.515, followed by ESG at 1.492, while the ESG × BOD interaction term has a VIF of 1.057. Overall, the correlation and VIF results indicate that multicollinearity does not pose a material concern for the regression analysis.

Table 3. Correlation Matrix and Multicollinearity Diagnostics

Variable	ESG	BOD	ESG × BOD	SIZE	ROA	INVINT	LEV	CAPINT	VIF
ESG	1								1.492
BOD	0.531	1							1.515
ESG × BOD	-0.053	0.115	1						1.057
SIZE	0.115	-0.025	0.065	1					1.049
ROA	0.067	0.031	0.01	-0.056	1				1.076

Variable	ESG	BOD	ESG × BOD	SIZE	ROA	INVINT	LEV	CAPINT	VIF
INVINT	-0.074	-0.036	-0.001	-0.044	-0.046	1			1.055
LEV	0.044	0.118	0.137	0.102	-0.2	-0.197	1		1.135
CAPINT	-0.039	0.124	0.027	0.036	-0.121	-0.01	0.025	1	1.05

Source: Research Data, 2026

Main Regression Results

Table 4 presents the main regression results using ETR as the primary proxy for tax avoidance. The analysis is reported sequentially from the baseline specification in Model 1 to the full moderation specification in Model 3.

Table 4. Main Regression Results for ETR

Variable	Model 1	Model 2	Model 3
ESG	0.007621*** (0.001350)	0.003975*** (0.001182)	0.004859*** (0.000951)
BOD	—	0.001739*** (0.000298)	0.001522*** (0.000210)
ESG × BOD	—	—	0.000411* (0.000069)
SIZE	0.000054 (0.000494)	0.000520 (0.000343)	0.000271 (0.000328)
ROA	0.000238 (0.008864)	-0.000206 (0.007191)	-0.003876 (0.007301)
LEV	0.013092 (0.009042)	0.002879 (0.008804)	-0.004465 (0.008784)
CAPINT	0.014832* (0.008934)	-0.001774 (0.009566)	-0.001896 (0.007949)
INVINT	0.002190 (0.012976)	-0.001886 (0.014025)	-0.005261 (0.014879)
Constant	0.203492***	0.209554***	0.212097***
Year effects	Yes	Yes	Yes
N	241	241	241
R-squared	0.335	0.525	0.645
Adj. R-squared	0.303	0.5	0.624
F-statistic	9.044	14.682	18.504

Note: Firm-level clustered standard errors are reported in parentheses;

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Source: Research Data, 2026

Table 4 presents the main regression results using ETR as the primary proxy for tax avoidance. In Model 1, ESG disclosure is positively and statistically significantly associated with ETR ($\beta = 0.007621$, $p < 0.01$). The coefficient remains positive and significant after board gender diversity is introduced in Model 2 and in the full moderation specification in Model 3 ($\beta = 0.004859$, $p < 0.01$). Because

higher ETR indicates lower tax avoidance, these results correspond to a negative association between ESG disclosure and tax avoidance and therefore support H1.

The main moderation result appears in Model 3. The ESG $\times$ BOD interaction is positive and statistically significant ($\beta = 0.000411$, SE = 0.000069, $p < 0.01$). This indicates that the positive association between ESG disclosure and ETR varies with the level of female representation on the Board of Directors. In terms of the underlying tax-avoidance construct, the result implies that the negative association between ESG disclosure and tax avoidance becomes stronger at higher levels of board gender diversity, supporting H2.

The R-squared increases from 0.335 in Model 1 to 0.525 in Model 2 and 0.645 in Model 3. The control variables are generally not statistically significant in the full moderation specification, suggesting that the principal empirical relationships are concentrated in ESG disclosure, board gender diversity, and their interaction.

Table 5. Conditional Effect of ESG Disclosure on ETR at Different Levels of Board Gender Diversity

Board gender diversity	Female directors (%)	Effect of ESG on ETR	p-value
Low (-1 SD)	8.44	0.000185	0.868
Mean	19.82	0.004859	<0.001
High (+1 SD)	31.2	0.009533	<0.001

Note: Low and high board gender diversity represent one standard deviation below and above the sample mean, respectively

Source: Research Data, 2026

To provide a more intuitive interpretation of the interaction effect, the conditional association between ESG disclosure and ETR was estimated at low, mean, and high levels of board gender diversity. As shown in Table 5, the association between ESG disclosure and ETR is small and statistically insignificant when female directors represent approximately 8.44% of the Board of Directors ($\beta = 0.000185$, $p = 0.868$). At the sample mean of 19.82% female representation, the association becomes positive and statistically significant ($\beta = 0.004859$, $p < 0.001$). At a relatively high level of board gender diversity, corresponding to approximately 31.20% female representation, the association becomes substantially stronger ($\beta = 0.009533$, $p < 0.001$).

These conditional effects provide further evidence that the relationship between ESG disclosure and ETR varies systematically with board gender diversity. Specifically, broader ESG disclosure is more strongly associated with

higher ETR, and consequently lower tax avoidance, when female representation on the Board of Directors is higher.

Robustness Test

Table 6 presents the robustness test results using the cash effective tax rate (CETR) as an alternative proxy for tax avoidance. CETR captures actual cash tax payments relative to pretax income and therefore provides a complementary measure to the accounting-based ETR used in the main analysis.

Table 6. Robustness Test Results Using CETR

Variable	CETR Model
ESG	0.005064*** (0.001081)
BOD	0.001373*** (0.000228)
ESG × BOD	0.000428* (0.000067)
SIZE	0.000214 (0.000347)
ROA	-0.005107 (0.008120)
LEV	-0.006601 (0.009968)
CAPINT	0.003880 (0.008611)
INVINT	-0.004794 (0.018870)
Year effects	Yes
N	241
R-squared	0.582
Adj. R-squared	0.558

Note: Firm-level clustered standard errors are reported in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Source: Research Data, 2026

The robustness analysis replaces ETR with CETR, which captures actual cash taxes paid relative to pretax income. The results remain consistent with the main specification. ESG disclosure is positively and significantly associated with CETR ($\beta = 0.005064$, $p < 0.01$), while board gender diversity is also positive and significant ($\beta = 0.001373$, $p < 0.01$). Most importantly, the ESG × BOD interaction remains positive and statistically significant ($\beta = 0.000428$, $SE = 0.000067$, $p < 0.01$).

Because both ETR and CETR are inversely related to tax avoidance, the consistent direction of the coefficients across the two proxies indicates that the main findings are not dependent on the accounting-based ETR measure alone. ETR reflects tax expense recognized for accounting purposes, whereas CETR captures actual cash tax payments. Although neither measure captures every dimension of corporate tax avoidance, their consistent results provide complementary evidence regarding the robustness of the main relationships.

As an additional panel-data robustness check, Model 3 was re-estimated using firm fixed effects together with year effects. The main findings remain unchanged. ESG disclosure remains positively and significantly associated with ETR ($\beta = 0.004827$, $p < 0.01$), while board gender diversity is also positive and significant ($\beta = 0.001533$, $p < 0.01$). Importantly, the ESG $\times$ BOD interaction remains positive and statistically significant ($\beta = 0.000432$, $p < 0.01$). The persistence of the interaction under firm fixed effects indicates that the main moderation result is not driven solely by time-invariant differences across firms.

3.2 Discussion

The results show that broader ESG disclosure is associated with lower tax avoidance among Indonesian energy firms, as reflected in the positive and significant relationship between ESG disclosure and ETR. This finding supports H1 and is consistent with stakeholder theory, which views firms as accountable to multiple stakeholders beyond shareholders (Freeman et al., 2021). Broader ESG disclosure increases the visibility of firms' sustainability commitments and may strengthen stakeholder expectations that these commitments are reflected consistently in other corporate decisions, including taxation. In this setting, aggressive tax avoidance may create tension between publicly communicated sustainability responsibilities and firms' broader economic contributions.

The finding is consistent with previous studies reporting that stronger ESG-related practices are associated with lower tax avoidance (Khairin & Firmansyah, 2025; Peixoto et al., 2024; Syahputri, 2025; Velte, 2023; Yoon et al., 2021). However, it differs from studies showing that ESG activities may coexist with greater tax aggressiveness (Davis et al., 2016; Kim & Lee, 2025; Lee, 2024; Ma et al., 2025; Yanto et al., 2025; Zhang & Yuan, 2025). The Indonesian energy-sector setting may help explain this divergence. Firms in this sector face simultaneous environmental scrutiny, regulatory oversight, and substantial fiscal visibility because of their reliance on natural resources and their economic

importance. Under these conditions, inconsistencies between sustainability disclosure and aggressive tax behavior may be particularly visible to stakeholders. This may increase the reputational and accountability consequences associated with tax behavior and help explain why broader ESG disclosure is associated with lower tax avoidance in the present setting.

The results further indicate that board gender diversity moderates the relationship between ESG disclosure and tax avoidance. The positive and significant $ESG \times BOD$ interaction supports H2, while the conditional-effects analysis provides a more substantive interpretation of this relationship. At a relatively low level of female representation (8.44%), the association between ESG disclosure and ETR is statistically insignificant. However, the association becomes positive and significant at the sample mean of female representation (19.82%) and becomes substantially stronger when female directors represent approximately 31.20% of the Board of Directors. Because higher ETR corresponds to lower tax avoidance, these results indicate that the negative association between ESG disclosure and tax avoidance becomes more pronounced as female representation on the Board of Directors increases.

This interpretation is consistent with prior evidence linking greater female board representation with sustainability-related outcomes and lower tax aggressiveness. Alkhawaja et al. (2023) and Odriozola et al. (2024) associate board gender diversity with stronger ESG-related outcomes, while Dakhli (2022), Jarboui et al. (2020), Lanis et al. (2017), Riguen et al. (2020), and Gaio et al. (2026) provide evidence connecting female board representation with corporate tax behavior. The present study extends this literature by showing that the intensity of female representation, measured as the proportion of female directors, moderates the ESG disclosure–tax avoidance relationship rather than merely having an independent association with tax behavior.

From a stakeholder perspective, the moderating role of board gender diversity suggests that the accountability implications of ESG disclosure depend partly on the governance context in which corporate decisions are made. Greater female representation may broaden the range of stakeholder interests considered in board-level decision-making and increase attention to reputational and accountability consequences. Under these conditions, publicly communicated sustainability commitments may be more closely aligned with other dimensions of corporate responsibility, including tax behavior. Thus, board gender diversity does not merely represent an additional governance characteristic; it conditions

the extent to which ESG-related accountability is associated with firms' fiscal behavior.

The moderating result is also broadly consistent with Hossain et al. (2025), who show that female board representation can shape the relationship between sustainability disclosure and tax avoidance, but differs from Sibuea and Afriani (2025), who report an insignificant moderating effect in an ASEAN-5 manufacturing setting. These differences suggest that the role of board gender diversity may depend on institutional and industry conditions. For Indonesian energy firms, environmental exposure, regulatory scrutiny, and fiscal relevance may increase the importance of board composition in translating sustainability disclosure into corporate behavior.

Finally, the robustness analyses reinforce the main findings. The CETR specification produces the same direction and statistical significance for ESG disclosure and the $ESG \times BOD$ interaction, indicating that the results are not dependent solely on the accounting-based ETR measure. The interaction also remains positive and significant when the full moderation model is re-estimated using firm fixed effects and year effects, reducing concern that the main result is driven by time-invariant differences across firms. Overall, the findings show that ESG disclosure, board gender diversity, and corporate tax behavior are interrelated dimensions of corporate accountability.

4. Conclusion

This study finds that broader ESG disclosure is associated with lower tax avoidance among Indonesian energy firms and that this relationship varies systematically with board gender diversity. The conditional-effects analysis shows that the negative association between ESG disclosure and tax avoidance becomes more pronounced at higher levels of female representation on the Board of Directors. The findings remain consistent when CETR is used as an alternative tax avoidance measure and when the full moderation model is re-estimated using firm fixed effects. These results extend stakeholder theory by indicating that sustainability disclosure and internal governance are jointly related to corporate fiscal behavior. Empirically, the study provides sector-specific evidence from Indonesian energy firms, while practically the findings suggest that ESG disclosure, tax behavior, and board composition may provide complementary information when evaluating corporate accountability.

Research Suggestions

This study is limited to listed Indonesian energy firms and measures board gender diversity using the proportion of female directors and ESG through disclosure-based content analysis. The use of ETR and CETR also restricts the analytical sample to firm-year observations with positive pretax income; therefore, the findings may not directly represent firms experiencing losses or zero pretax income. Future research may extend the analysis to other sectors or countries, use alternative measures of female board representation and ESG quality, and employ tax avoidance proxies that can accommodate a broader range of firm profitability conditions.

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