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# ESG Score, Carbon Intensity, and Tax Aggressiveness: Evidence from ASEAN Energy Companies

**Salsabila Khairunnisa[1*], Memed Sueb[2], Agus Puji Priyono[3]**
[1]Universitas Padjadjaran, Bandung, Indonesia, salsabila18030@unpad.ac.id
[2]Universitas Padjadjaran, Bandung, Indonesia, memed.sueb@unpad.ac.id
[3]Universitas Padjadjaran, Bandung, Indonesia, agus.priyono2023@unpad.ac.id

*Corresponding Author: salsabila18030@unpad.ac.id[1]

**Abstract:** This study examines the effects of environmental, social, and governance performance and carbon intensity on tax aggressiveness among energy companies in Indonesia, Malaysia, Singapore, and Thailand during the 2020-2024 period. The study was motivated by the growing concern over corporate sustainability and its potential influence on responsible tax behavior in the ASEAN region. A quantitative research design was employed using secondary data collected from the Refinitiv database. The sample consisted of 17 energy companies, resulting in 85 firm-year observations selected through purposive sampling. Panel data regression analysis was applied to examine the proposed relationships. The findings indicate that environmental, social, and governance performance significantly affects tax aggressiveness, suggesting that companies with stronger sustainability performance are less likely to engage in aggressive tax practices. In contrast, carbon intensity does not have a significant effect on tax aggressiveness. These findings provide empirical support for Stakeholder Theory by highlighting the importance of sustainability performance in promoting responsible corporate tax behavior. This study contributes to the sustainability and taxation literature by integrating environmental, social, and governance performance and carbon intensity within a single analytical framework, providing broader evidence on the relationship between sustainability and corporate tax behavior among energy companies in the ASEAN region.

**Keywords:** environmental, social, and governance performance, carbon intensity, tax aggressiveness, energy sector, ASEAN.

## INTRODUCTION

Tax aggressiveness has become an important issue in corporate governance as it relates to firms' efforts to minimize tax burdens through various tax planning strategies, whether conducted legally or illegally (Aladwey & Alsudays, 2024; Mitroulia et al., 2025). Such practices have attracted considerable attention from regulators, investors, and society due to their potential to create reputational risks and undermine stakeholders' trust. At the same time, firms are required to maintain financial performance and maximize firm value, creating a trade-

off between tax efficiency and corporate legitimacy (Lanis & Richardson, 2015; Menicacci & Simoni, 2024). The phenomenon of tax aggressiveness has also received increasing attention in the ASEAN region. Differences in tax systems, compliance levels, and the development of sustainability policies across Indonesia, Malaysia, Singapore, and Thailand create diverse institutional environments that may lead to variations in corporate tax behavior. In addition, these countries have demonstrated growing commitments to sustainability initiatives and the transition toward net-zero emissions (International Energy Agency, 2024; ASEAN Centre for Energy, 2024).

Sustainability pressures are particularly pronounced for firms operating in the energy sector. According to the Refinitiv classification, the energy sector is one of the largest contributors to carbon emissions due to its intensive use of energy, fossil fuels, and capital-intensive operations (International Energy Agency, 2024). Besides facing increasing pressure to reduce carbon emissions, firms in this sector also possess greater opportunities to engage in tax planning through asset depreciation optimization, debt financing, and other efficiency strategies. Previous studies also suggest that tax compliance and tax planning remain important concerns among energy companies because of their strategic economic role, substantial capital investment, and the availability of fiscal incentives (Tarmidi et al., 2025; Arum et al., 2025). Therefore, firms operating in the energy sector provide an appropriate setting for examining corporate tax aggressiveness.

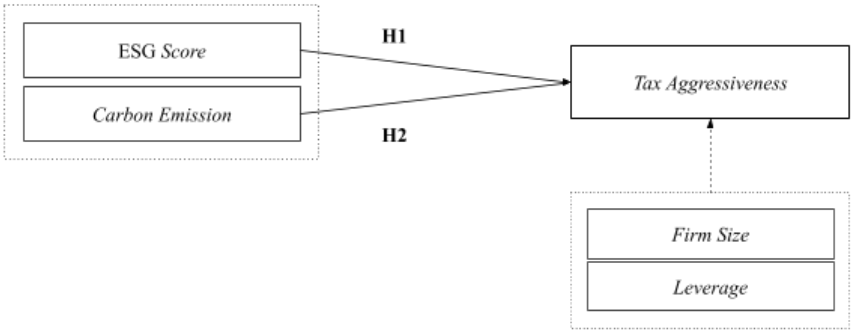
The growing importance of sustainability has made Environmental, Social, and Governance (ESG) performance an essential indicator of corporate governance quality and long-term corporate value creation (Friede et al., 2015). Firms with higher ESG scores are expected to avoid excessive tax aggressiveness because they are more concerned with maintaining their reputation, legitimacy, and long-term relationships with stakeholders. Previous empirical studies generally report that stronger ESG performance is associated with lower tax avoidance because it promotes greater transparency, stronger internal control, and more responsible corporate behavior (Yoon et al., 2021; Hidayat & Zuhroh, 2023; Jiang et al., 2024; Syahputri, 2025). However, the relationship remains inconclusive. While several studies document a negative association between ESG performance and tax aggressiveness, others argue that sustainability initiatives may also function as legitimacy mechanisms that enable firms to pursue aggressive tax strategies without sustainability affecting stakeholder perceptions (Davis et al., 2016; Mitroulia et al., 2025).

Apart from ESG performance, sustainability pressure is also reflected in carbon intensity, which indicates the amount of carbon emissions generated relative to a firm's economic activity. Rising environmental regulations may influence firms' economic decisions, including their tax policies. Previous studies suggest that environmental regulations, carbon risk, and emission-reduction costs may encourage firms to adopt more aggressive tax strategies to offset increasing sustainability expenditures and preserve cash flow (Feng et al., 2022; Yamen & Mersni, 2023; Souguir et al., 2023). Nevertheless, other studies argue that firms facing greater environmental scrutiny tend to become transparent and cautious in their tax behavior, indicating that the relationship between environmental performance and tax aggressiveness remains context-dependent (Hoi et al., 2013; Souguir et al., 2023).

Although numerous studies have investigated ESG performance, carbon intensity, and tax aggressiveness, most focus on a single country and examine these variables separately. Existing evidence is primarily drawn from Korea, Indonesia, China, the United Kingdom, and several other individual jurisdictions (Yoon et al., 2021; Hidayat & Zuhroh, 2023; Jiang et al., 2024; Elgharbawy & Aladwey, 2025). Consequently, their findings cannot be readily generalized to the ASEAN region, which is characterized by heterogeneous institutional environments and sustainability policies. Therefore, this study integrates ESG score and carbon intensity within a single analytical framework to examine their effects on tax aggressiveness

among firms operating in the energy sector in Indonesia, Malaysia, Singapore, and Thailand during the period 2020-2024. This study contributes to the development of Stakeholder Theory and enriches the literature on the relationship between sustainability and corporate tax behavior within a multi-country ASEAN context. Based on the theoretical arguments and previous empirical findings, the conceptual framework of this study is presented in Figure 1.

**Figure 1. Research Framework**




H1: ESG score affects tax aggressiveness among firms operating in the energy sector in ASEAN.
H2: Carbon intensity affects tax aggressiveness among firms operating in the energy sector in ASEAN.

## METHODS

This study employs a quantitative research design using secondary data to examine the effects of ESG score and carbon intensity on tax aggressiveness among firms operating in the energy sector in the ASEAN region. The population consists of firms operating in the energy sector across four ASEAN countries, namely Indonesia, Malaysia, Singapore, and Thailand during the period 2020-2024. The sample was selected using purposive sampling based on the following criteria: (1) firms classified in the energy sector according to the Refinitiv classification during 2020-2024; (2) firms with complete ESG score and carbon emission data; and (3) firms with complete financial statement data required to calculate tax aggressiveness, firm size, and leverage. The sample selection process is presented in Table 1.

**Table 1. Sample Selection**

| Criteria | Firms |
|---|---|
| Energy firms listed in Refinitiv (2020-2024) | 149 |
| Firms without complete ESG score and carbon emission data | (131) |
| Firms without complete financial statement data | (1) |
| Final sample (firms) | 17 |
| Firms-year observations (2020-2024) | 85 |

Source: Refinitiv database, processed by the authors (2026)

Based on the purposive sampling criteria, 17 firms met the research requirements, resulting in 85 firm-year observations over the 2020-2024 period. The final sample consists of firms from Indonesia (5 firms), Malaysia (4 firms), Singapore (1 firm), and Thailand (7 firms).

The study covers the period from 2020-2024. Secondary data were obtained from the Refinitiv database, including ESG scores, carbon emission data, and financial statement information. Tax aggressiveness was measured using the Effective Tax Rate (ETR), calculated as total tax expense divided by pre-tax income (Dyreng et al., 2008; Hanlon & Heitzman, 2010). ESG performance was proxied by the Refinitiv ESG score, while carbon intensity was measured as the ratio of total carbon emissions to revenue. Firm size was measured using the

natural logarithm of total assets, whereas leverage was calculated as total debt divided by total assets. Firm size and leverage were included as control variables.

**Table 2. Variable Measurement**

| Variable | Measurement |
|---|---|
| ESG Score (ESG) | Refinitiv ESG Score (Overall ESG Score; range 1-100) |
| Carbon Intensity (CI) | Total Carbon Emissions ÷ Revenue |
| Tax Aggressiveness (ETR) | Effective Tax Rate (ETR) = Total Tax Expense ÷ Pre-tax Income |
| Firm Size (SIZE) | Ln (Total Assets) |
| Leverage (LEV) | Total Debt / Total Assets |

Source: Research Data, compiled by the authors (2026)

Panel data regression analysis was employed to examine the effects of ESG score and carbon intensity on tax aggressiveness. The analysis began with descriptive statistics, followed by panel model selection using the Chow test, Hausman, and Lagrange Multiplier tests. Classical assumption tests, including normality, multicollinearity, and heteroscedasticity tests, were subsequently conducted to assess the validity of the regression model. The hypotheses were tested using the t-test, while the F-test and adjusted coefficient of determination (Adjusted $R^2$) were used to evaluate the overall significance and explanatory power. The regression model is specified as follows:

$$ETRit=\alpha+\beta1ESGit+\beta2CIit+\beta3SIZEit+\beta4LEVit+\varepsilon it$$

where:
*ETR* = Effective Tax Rate (tax aggressiveness)
*ESG* = ESG score
*CI* = Carbon intensity
*SIZE* = Firm size
*LEV* = Leverage
*i* = Firm
*t* = Year
$\varepsilon$ = Error term

## RESULTS AND DISCUSSION

### Result

Descriptive statistics were employed to summarize the characteristics of the research variables. The analysis includes the mean, median, minimum, maximum, and standard deviation of each variable. The descriptive statistics are presented in Table 3.

**Table 3. Descriptive Statistics**

| Variable | Mean | Median | Minimum | Maximum | Std. Dev. |
|---|---|---|---|---|---|
| **Effective Tax Rate (ETR)** | 0.2700 | 0.2310 | 0.0060 | 0.9030 | 0.1646 |
| **ESG Score** | 59.9134 | 62.9200 | 22.9000 | 86.4900 | 17.5402 |
| **Carbon Intensity** | 0.9788 | 0.2000 | 0.0000 | 16.9000 | 2.9256 |
| **Firm Size** | 21.8800 | 21.6000 | 17.9000 | 25.4000 | 1.5677 |
| **Leverage** | 0.2306 | 0.1610 | 0.0100 | 0.6100 | 0.1769 |

Source: Research data processed by the authors (2026)

The study consists of 85 firm-year observations from energy companies operating in Indonesia, Malaysia, Singapore, and Thailand during the period 2020-2024. The descriptive statistics indicate that the average Effective Tax Rate, which proxies tax aggressiveness, is 0.2700, with values ranging from 0.0060 to 0.9030 and a standard deviation of 0.1646. These figures suggest considerable variation in corporate tax payments across the sampled firms. The

average ESG score is 59.91, ranging from 22.90 to 86.49, with a standard deviation of 17.54, indicating substantial differences in sustainability performance among the sampled companies. Carbon intensity records a mean value of 0.9788, with a minimum value of 0.0000 and a maximum value of 16.9000. The relatively high standard deviation (2.93) compared with its mean indicates that carbon intensity varies considerably across firms.

Regarding the control variables, firm size has an average value of 21.88, with values ranging from 17.90 to 25.40, indicating that the sampled companies are generally large firms. Leverage has an average value of 0.2306, with a minimum value of 0.0100 and maximum value of 0.6100, suggesting that debt finances approximately 23.06% of total assets on average. The relatively low standard deviation (0.1769) indicates that leverage is relatively homogeneous across the sampled firms.

To determine the most appropriate panel data estimation model, the Chow, Hausman, and Lagrange Multiplier (LM) tests were conducted. The results of the panel model selection are presented in Table 4.

**Table 4. Panel Model Selection**

| Test | Probability | Selected Model |
|---|---|---|
| **Chow Test** | 0.0000 | Fixed Effect Model |
| **Hausman Test** | 0.1688 | Random Effect Model |
| **Lagrange Multiplier Test** | 0.0000 | Random Effect Model |

Source: Research data processed by the authors (2026)

The Chow test indicates that the Fixed Effect Model is preferred over the Common Effect Model. However, the Hausman test suggests that the Random Effect Model is more appropriate than the Fixed Effect Model, while the Lagrange Multiplier test confirms that the Random Effect Model (REM) was selected as the final estimation model for hypothesis testing. Following the panel model selection, the Random Effect Model (REM) was employed to examine the effects of ESG score and carbon intensity on tax aggressiveness. The regression results are presented in Table 5.

**Table 5. Random Effect Model Regression Results**

| Variable | Coefficient | t-Statistic | Probability |
|---|---|---|---|
| **C** | 0.560901 | 0.570177 | 0.5702 |
| **ESG Score** | 0.003822 | 2.718516 | 0.0080 |
| **Carbon Intensity** | 0.002183 | 0.279069 | 0.7809 |
| **Firm size** | -0.013790 | -0.065261 | 0.9481 |
| **Leverage** | -0.014579 | -0.095504 | 0.9245 |

Source: Research data processed by the authors (2026)

The regression results indicate that ESG score has a statistically significant positive coefficient ($\beta$= 0.003822; p= 0.0080), suggesting that ESG score significantly affects tax aggressiveness, as measured by the Effective Tax Rate (ETR). In contrast, carbon intensity does not have a statistically significant effect, as indicated by probability value of 0.7809. Similarly, the control variable, firm size and leverage, are not significantly associated with tax aggressiveness, with probability values of 0.9481 and 0.9245, respectively.

**Table 6. Coefficient of Determination**

| Statistic | Value |
|---|---|
| R-squared | 0.1060 |
| Adjusted R-squared | 0.0614 |

Source: Research data processed by the authors (2026)

Based on Table 6, the adjusted R-squared value is 0.0614, indicating that ESG score, carbon intensity, firm size, and leverage explain 6.14% of the variation in tax aggressiveness. The remaining 93.86% is explained by other factors outside the model.

**Discussion**

The regression results indicate that ESG score has a statistically significant positive effect on the Effective Tax Rate (ETR). Since a higher ETR reflects lower levels of tax aggressiveness, this finding suggests that firms with higher ESG scores tend to engage in less aggressive tax practices. Accordingly, **H1 is supported**, indicating that ESG score significantly affects tax aggressiveness among energy firms in the ASEAN region.

This finding is consistent with Stakeholder Theory, which argues that firms are responsible not only to shareholders but also to a broader group of stakeholders, including governments, investors, customers, employees, and local communities (Freeman, 1984). Firms with strong ESG performance are expected to maintain legitimacy and preserve long-term relationships with stakeholders by adopting more transparent and responsible business practices. This perspective is consistent with previous studies that showing that ESG performance strengthens corporate transparency, internal control, and stakeholder monitoring, thereby reducing firms' incentives to engage in aggressive tax practices (Jiang et al., 2024; Elgharbawy & Aladwey, 2025). Since taxation represents an important aspect of corporate accountability, companies with higher ESG performance are more likely to avoid overly aggressive tax strategies that could damage their reputation and stakeholder trust. This argument is further supported by the concept of shared value creation proposed by Freeman and Velamuri (2006), which emphasizes that long-term corporate success depends on balancing economic objectives with social and ethical responsibilities.

The findings are consistent with previous empirical studies reporting that firms with superior ESG performance exhibit lower levels of tax aggressiveness. Yoon et al. (2021), Hidayat & Zuhroh (2023), and Syahputri (2025) consistently found that companies with higher ESG performance are less likely to engage in aggressive tax practices. The results may also reflect the characteristics of the energy sector in the ASEAN region. Similar evidence is reported by Menicacci and Simoni (2024), who argued that greater ESG-related media visibility and stakeholder scrutiny discourage firms from engaging in aggressive tax behavior because of increasing reputational risks. As one of the largest contributors to carbon emissions, energy companies are subject to greater environmental regulation, public scrutiny, and stakeholder pressure than firms in many other industries (International Energy Agency [IEA], 2024; ASEAN Centre for Energy [ACE], 2024). The characteristics of the energy sector may also explain these findings. Energy companies operate under greater environmental scrutiny and are expected to balance financial performance with sustainability commitments. Previous studies have similarly highlighted that tax planning and tax compliance remain important issues in the energy industry because of its strategic role in the economy and high regulatory exposure (Tarmidi et al., 2025; Arum et al., 2025). Consequently, these firms are encouraged to strengthen ESG performance and maintain corporate legitimacy through more transparent and responsible business practices, including greater tax compliance.

In contrast, carbon intensity does not have a statistically significant effect on tax aggressiveness, indicating that **H2 is not supported**. From the perspective of Stakeholder Theory, firms operating in carbon-intensive industries are expected to respond to increasing environmental pressure by improving sustainability practices and maintaining accountability to stakeholders. However, the findings suggest that differences in carbon intensity do not necessarily influence corporate tax strategies. This implies that tax planning decisions are likely to be driven by broader financial, governance, and regulatory considerations rather than by the level of carbon intensity alone.

The findings differ from Feng et al. (2022), Yamen and Mersni (2023), and Souguir et al. (2023), who argued that increasing environmental compliance costs may encourage firms to engage in more aggressive tax planning to offset sustainability-related expenditures. However, the present study indicates that carbon intensity alone is insufficient to explain variations in tax aggressiveness among energy firms in the ASEAN region. The insignificant relationship may also indicate that carbon intensity primarily reflects operational and production efficiency rather than managerial discretion over tax planning decisions. Consequently, environmental performance and corporate tax behavior may represent two distinct managerial dimensions that are influenced by different strategic objectives.

## CONCLUSION

This study concludes that ESG score and carbon intensity exhibit different relationships with tax aggressiveness among energy companies in Indonesia, Malaysia, Singapore, and Thailand. The findings demonstrate that ESG score significantly influences corporate tax behavior, whereas carbon intensity does not significantly affect tax aggressiveness. These results indicate that ESG performance, particularly ESG practices, is more closely associated with responsible corporate tax behavior than environmental performance measured by carbon intensity.

The findings extend the application of Stakeholder Theory by providing empirical evidence that stronger ESG performance is associated with greater corporate accountability in taxation. Furthermore, this study contributes to the sustainability and taxation literature by integrating ESG score and carbon intensity into a single analytical framework, offering a broader understanding of how different dimensions of sustainability relate to corporate tax behavior in the ASEAN region. The findings also provide practical insights for regulators and corporate managers by highlighting the importance of strengthening ESG implementation as part of corporate governance and responsible tax practices.

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