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THE ROLE OF ESG PRACTICES AND DIGITAL TRANSFORMATION IN MITIGATING CORPORATE TAX AVOIDANCE: EVIDENCE FROM NON-FINANCIAL FIRMS IN INDONESIA

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ABSTRACT

This study examines the effect of Environmental, Social, and Governance (ESG) performance and digital transformation on corporate tax avoidance among non-financial firms listed on the Indonesia Stock Exchange during 2015–2024. Based on stakeholder and agency theories, ESG is expected to reduce opportunistic tax behavior, while digital transformation enhances transparency and monitoring. Using a quantitative approach, this study applies panel data regression on 463 firm-year observations. Tax avoidance is measured using Book-Tax Differences (BTD), GAAP Effective Tax Rate (GAAP ETR), and Cash Effective Tax Rate (CETR). ESG data are obtained from LSEG Refinitiv, while digital transformation is measured through textual analysis of annual reports. The results show that ESG and digital transformation do not significantly affect tax avoidance when measured by CETR and BTD, although ESG has a positive effect on GAAP ETR at the 10% significance level. Robustness testing using the Generalized Method of Moments (GMM) indicates that ESG and digital transformation have a significant negative effect on CETR. ESG also shows a negative effect on BTD at the 10% level, while digital transformation remains insignificant. Neither variable is significant in the GAAP ETR model. This finding suggests that optimizing ESG practices and digital transformation can improve corporate tax compliance. Further research is recommended to include additional variables to enrich the analysis.

KEYWORDS: Agency theory, Digital transformation, Environmental, Stock Exchange, Stakeholder theory, Tax avoidance.

1. INTRODUCTION

Taxes are the primary source of government revenue and play a strategic role in financing national development and improving public welfare. In Indonesia, tax revenue has consistently been the largest contributor to state revenue and has shown a long-term upward trend. This reflects the critical role of taxation in maintaining fiscal sustainability. However, from a corporate perspective, taxes are often perceived as a burden that reduces after-tax profits and pressures financial performance. This condition encourages firms to engage in various tax planning strategies, including tax avoidance, in order to minimize their tax liabilities (Slemrod & Gillitzer, 2013; OECD, 2020). Tax avoidance itself is a global phenomenon that occurs not only in developed countries but also in developing economies such as Indonesia (Hanlon & Heitzman, 2010). Several tax dispute cases involving large corporations, such as PT Bentoel Internasional Investama Tbk, PT Toyota Motor Manufacturing Indonesia, and PT Japfa Comfeed Indonesia Tbk, illustrate how business strategies, organizational structures, and cross-jurisdictional transactions can be utilized to influence the level of corporate tax liabilities (Prima & Dewi, 2019; Wardana & Asalam, 2022; Laluhu, 2020). This indicates that tax avoidance practices are influenced not only by internal firm factors but also by the complexity of the business environment and tax regulations.

Theoretically, tax avoidance practices can be explained from various perspectives. Stakeholder Theory emphasizes that companies have responsibilities not only to shareholders but also to various stakeholders, including the government and the general public. In this context, tax compliance becomes part of a company's efforts to maintain social legitimacy and reputation in the public eye (Freeman, 1984; Hanlon & Heitzman, 2010). Conversely, Agency Theory explains that the separation of ownership and control within a company can lead to conflicts of interest and information asymmetry between managers and owners. This situation creates opportunities for managers to make opportunistic decisions, including designing aggressive tax strategies for specific interests (Jensen & Meckling, 1976; Desai & Dharmapala, 2006). Thus, tax avoidance behavior can be understood as the result of the interaction between external pressure from stakeholders and internal management incentives.

Environmental, Social, and Governance (ESG) has garnered increasing attention in recent years as part of sustainable business practices. Effective ESG implementation is believed to enhance transparency, strengthen a company's reputation, and reduce information asymmetry between companies and stakeholders. In this context, companies with high ESG performance tend to be more cautious in making decisions that could potentially damage their reputation, including in tax avoidance practices (Kim et al., 2018; Jiang et al., 2024; Zhang et al., 2023). In other words, a commitment to ESG can serve as a non-financial mechanism that encourages companies to behave more ethically and responsibly, including in fulfilling their tax obligations.

Furthermore, the advancement of digital transformation is playing an increasingly important role in supporting corporate governance. Digital transformation enables improved information quality, system integration, and the effectiveness of internal oversight through the use of more advanced information technology (Fitzgerald et al., 2014; Zhao et al., 2023; Tiantian et al., 2023). Digitization enables better data integration and more real-time monitoring processes, thereby increasing transparency and the traceability of corporate activities. This situation ultimately limits management's leeway to engage in opportunistic actions, including in tax policy. With increased transparency and oversight, the risk of tax avoidance practices being detected also rises, leading companies to adopt a more cautious approach to their tax strategies.

Although a number of studies have examined the relationship between ESG, digital transformation, and tax avoidance separately, studies that integrate these three aspects simultaneously remain relatively limited, particularly in the context of developing countries such as Indonesia. In fact, institutional characteristics and the level of regulatory enforcement in developing countries can influence the effectiveness of ESG and digitalization in curbing tax avoidance practices. Therefore, this study aims to analyze the impact of ESG performance and digital transformation on tax avoidance practices among non-financial companies listed on the Indonesia Stock Exchange during the 2015–2024 period, with the expectation of providing empirical contributions to the literature as well as practical implications for companies and regulators. The structure of this study is organized as follows. Section 2 reviews the relevant literature and develops the research hypotheses. Section 3 explains the data and methodology used. Section 4 presents the empirical results and discussion. Section 5 summarizes the research findings and provides implications and recommendations.

2. LITERATURE REVIEW AND HYPOTHESIS

Environmental, Social, and Governance (ESG) performance reflects a company's commitment to responsible and sustainable business practices. Based on stakeholder theory, companies are expected to consider the interests of various stakeholders, including the government and the public (Freeman, 1984). Corporate tax payments are an important form of contribution to public welfare; consequently, responsible tax behavior is increasingly viewed as part of corporate social responsibility. Companies with better ESG performance tend to maintain their reputation and stakeholder trust, which can ultimately improve access to external financing and lower the cost of capital (Kim et al., 2018; Luo et al., 2023; Pastor et al., 2021). Conversely, aggressive tax avoidance practices have the potential to damage that reputation and erode stakeholder trust.

Based on the governance perspective, the governance dimension of ESG strengthens internal control systems and enhances corporate transparency. An effective board and the presence of an independent audit committee can limit managers' incentives to engage in aggressive tax strategies (Krishnan, 2005; Hoitash et al., 2009). Furthermore, companies with high ESG performance generally face greater scrutiny from investors and financial analysts, which serves as an external monitoring mechanism to curb opportunistic behavior (Chen & Lin, 2017; Allen et al., 2016). Although ESG disclosures may in some cases be symbolic or merely window dressing (Yanto et al., 2025), increasing transparency pressures and stakeholder expectations mean that substantive ESG implementation tends to reduce aggressive tax avoidance practices.

H1. Environmental, Social, and Governance (ESG) performance has a negative impact on tax avoidance.

In addition to ESG, a company's technological capabilities also play a role in influencing tax behavior. Digital transformation reflects the level of technology adoption that enables companies to integrate information systems, improve data processing quality, and strengthen internal control mechanisms. Within the perspective of Agency Theory and Stakeholder Theory, digital transformation can be understood as a mechanism that enhances transparency and the quality of oversight within a company. Increased digitalization enables greater data traceability and more transparent reporting, thereby reducing information asymmetry between managers and stakeholders. Within the Agency Theory framework, this situation limits the scope for managers to engage in opportunistic behavior, whereas in Stakeholder Theory, greater transparency encourages companies to be more accountable to stakeholder expectations. Higher levels of digitalization also increase the likelihood that tax avoidance practices will be detected by regulators, investors, and other stakeholders (Zhao & Chai, 2023; Zhang & She, 2024). Empirical evidence suggests that companies with stronger digital capabilities tend to have more transparent reporting systems, thereby increasing the reputational costs and regulatory risks associated with tax avoidance (Chen et al., 2024). Therefore, digital transformation is expected to directly curb tax avoidance practices through increased transparency and oversight.

H2. Digital transformation has a negative impact on tax avoidance.

This study also controls for several firm characteristics commonly associated with tax avoidance, namely profitability, leverage, and firm size. Profitability reflects a firm's ability to generate profits and can influence incentives for tax planning (Sunarsih et al., 2019; Hossain et al., 2024). Leverage indicates the level of debt usage, where interest expenses can provide tax-reducing benefits that encourage tax planning strategies (Brigham & Houston, 2018). Meanwhile, firm size is also considered because larger firms tend to face stricter public scrutiny and regulation, which may limit aggressive tax avoidance practices (Hossain et al., 2024).

3. METHOD

3.1. Research Design

Data and Sample In this study, we examine the relationship between Environmental, Social, and Governance (ESG) performance and corporate tax avoidance, with digital transformation serving as a moderating variable. The study sample consists of non-financial companies listed on the Indonesia Stock Exchange (IDX) during the 2015–2024 period. Financial firms were excluded because they operate under different regulatory frameworks and financial reporting standards compared to non-financial firms. Financial data were obtained from annual reports and financial statements available on the IDX's official website and in company publications. ESG data were obtained from the LSEG Refinitiv database, which provides standardized ESG scores and is widely used in empirical research due to its methodological consistency and global coverage. This sample selection process is presented in Table 1. The initial sample consisted of 827 non-financial companies listed on the IDX during the 2015–2024

period. Subsequently, companies without an ESG score in the LSEG Refinitiv database, companies with incomplete financial data or unavailable annual reports, and companies reporting negative pre-tax profits were excluded from the sample. Thus, the final sample size for the study was 463 firm-year observations.

Variable Measurement: In this section, we describe the measurement of the dependent, independent, and control variables used in this study. Digital transformation is measured using a text-based approach, following Chen et al. (2024). Specifically, the measurement involves identifying the frequency of keywords related to digital technology in companies' annual reports. These keywords encompass five main categories: Artificial Intelligence, Big Data, Cloud Computing, Blockchain, and Digital Technology Applications. Keyword frequency totals were then accumulated for each firm-year observation to reflect the intensity of digital transformation disclosures. Text processing was performed using Python-based text mining techniques, which enabled automatic data extraction, text cleaning, tokenization, and keyword matching within the annual report documents. To reduce skewness and account for differences in document length, the total keyword frequency was transformed into natural logarithms (ln), with the addition of a constant to avoid zero values. Table 3.1 presents a list of keywords used to identify digital transformation in corporate annual reports, grouped by major digital technology type.

Table 1: Keywords for Identifying Digital Transformation in Annual Reports.

Type	Keywords / Characteristics
Artificial Intelligence Technology	Artificial Intelligence, Business Intelligence, Image Understanding, Investment Decision Support System, Intelligent Data Analysis, Intelligent Robot, Machine Learning, Deep Learning, Semantic Search, Biometrics, Face Recognition, Voice Recognition, Identity Verification, Automatic Driving, Natural Language Processing
Big Data Technology	Big Data, Data Mining, Text Mining, Data Visualization, Credit Reporting, Augmented Reality, Mixed Reality, Virtual Reality, Heterogeneous Data
Cloud Computing Technology	Cloud Computing, Stream Computing, Graph Computing, Memory Computing, Multi-party Security Computing, Brain Like Computing, Green Computing, Cognitive Computing, Fusion Architecture, EB Level Storage, Internet of Things, Information Physics Systems
Blockchain Technology	Blockchain, Digital Currency, Distributed Computing, Differential Privacy Technology, Smart Financial Contract
Digital Technology Application	Mobile Internet, Industrial Internet, Internet Medical, E-commerce, Mobile Payment, Third Party Payment, NFC Payment, Smart Energy, B2B, B2C, C2B, C2C, O2O, Internet Connection, Smart Wearing, Smart Agriculture, Smart Transportation, Smart Medical, Smart Customer Service, Smart Home, Smart Investment Advisor, Smart Culture and Tourism, Smart Environmental Protection, Smart Grid, Smart Marketing, Digital Marketing, Unmanned Retail, Internet Finance, Digital Finance, Fintech, Financial Technology, Quantitative Finance, Open Banking

The dependent variable is corporate tax avoidance. Consistent with prior literature, tax avoidance is measured using three proxies: Cash Effective Tax Rate (Cash ETR), GAAP Effective Tax Rate (GAAP ETR), and Book–Tax Differences (BTD). Cash ETR captures the actual tax payments made by firms, GAAP ETR reflects accounting-based tax expenses, and BTD measures the difference between accounting income and taxable income. The independent variable is ESG performance, measured using the ESG score obtained from the LSEG Refinitiv database. This score reflects firms' environmental, social, and governance performance. The moderating variable is digital transformation, measured using a text mining approach that captures the intensity of digital-related disclosures in annual reports. To control for firm heterogeneity, several control variables commonly used in tax avoidance studies are included in the analysis. These variables include profitability, leverage, and firm size. Profitability is measured using return on assets (ROA), leverage is measured as the ratio of total debt to total assets, and firm size is measured as the natural logarithm of total assets.

The dependent variable in this study is tax avoidance, which is measured using three proxies. First, the Cash Effective Tax Rate (CASH_ETR) reflects the actual tax payment relative to income, calculated as cash taxes paid divided by pre-tax income (Chen et al., 2024; Gao et al., 2025; Campa et al., 2022; Sarhan et al., 2024; Cho et al., 2025; Ma et al., 2025; Tang et al., 2025). Second, Book-Tax Differences (BTD) represent the difference between accounting income and taxable income, measured by (pre-tax income minus taxable income) divided by total assets. Third, the GAAP Effective Tax Rate (GAAP_ETR) measures the ratio of total tax expense to accounting income, calculated as total tax expense divided by pre-tax income.

The independent variable is ESG performance,

which is measured using a composite ESG score that reflects environmental, social, and governance performance based on data obtained from the Refinitiv/ESG database (LSEG, 2024). Furthermore, the moderating variable in this study is digital transformation, which is measured by the intensity of digital-related disclosures in annual reports using a text mining approach, calculated as the total number of digital keywords divided by the total number of words (Chen et al., 2024).

In addition, this study employs several control variables. Profitability (ROA) is measured as net income divided by total assets to reflect firm profitability (Jiang et al., 2024; Chen et al., 2024; Wongsinhirun et al., 2024; Hossain et al., 2024; Cho et al., 2025). Leverage (DER) represents the firm's capital structure, calculated as total debt divided by total equity (Lee & Bose, 2021; Jiang et al., 2024; Wongsinhirun et al., 2024; Chen et al., 2024). Lastly, firm size (SIZE) is measured using the natural logarithm of total assets, which indicates the scale of the firm (Jiang et al., 2024; Chen et al., 2024; Wongsinhirun et al., 2024; Hossain et al., 2024; Cho et al., 2025).

Models: This study employs panel data regression analysis using the Generalized Method of Moments (GMM) estimator to test the research hypotheses. The GMM approach was chosen because it effectively addresses various econometric issues commonly encountered in panel data studies, including endogeneity, heteroscedasticity, and autocorrelation. Furthermore, this method is effective in mitigating potential reverse causality between ESG performance and corporate tax avoidance. The empirical model was estimated using EViews version 14 software, which facilitates the efficient application of GMM panel estimation techniques. In this study, a panel data regression model was used to test the effects of ESG performance and digital transformation on corporate tax avoidance, as well as the moderating role of digital transformation in that relationship. In addition to dynamic panel estimation, this study also uses the Fixed Effect Model (FEM) to control for unobserved heterogeneity among firms. The FEM specifications for the three tax avoidance proxies are as follows:

$Y_1 = \alpha + \beta1ESG + \beta2DT + \beta3ROA + \beta4DER + \beta5SIZE + \varepsilon$.....(1)

$Y_2 = \alpha + \beta1ESG + \beta2DT + \beta3ROA + \beta4DER + \beta5SIZE + \varepsilon$.....(2)

$Y_3 = \alpha + \beta1ESG + \beta2DT + \beta3ROA + \beta4DER + \beta5SIZE + \varepsilon$.....(3)

Where Y1, Y2, and Y3 represent corporate tax avoidance measured using Cash ETR, BTD, and GAAP ETR. The primary independent variable is ESG performance (ESG), while digital transformation (DT) serves as the secondary independent variable. Control variables include firm profitability (ROA), leverage (DER), and firm size (SIZE). Regression coefficients are denoted by β1 through β5, α is the constant, and ε is the error term reflecting the variation in tax avoidance that cannot be explained by the model. Furthermore, to address potential endogeneity and persistence in tax avoidance behavior, this study also employs the First-Difference Generalized Method of Moments (FD-GMM). Lagged dependent variables are used as instruments to produce consistent and robust estimates. The dynamic model specification is as follows:

$$CASH\_ETR_{it} = \rho CASH\_ETR_{it-1} + \beta_1 ESG_{it} + \beta_2 DT_{it} + \beta_3 ROA_{it} + \beta_4 DER_{it} + \beta_5 SIZE_{it} + \varepsilon_{it} \quad \text{.....(4)}$$

$$BTD_{it} = \rho BTD_{it-1} + \beta_1 ESG_{it} + \beta_2 DT_{it} + \beta_3 ROA_{it} + \beta_4 DER_{it} + \beta_5 SIZE_{it} + \varepsilon_{it} \quad \text{.....(5)}$$

$$GAAP\_ETR_{it} = \rho GAAP\_ETR_{it-1} + \beta_1 ESG_{it} + \beta_2 DT_{it} + \beta_3 ROA_{it} + \beta_4 DER_{it} + \beta_5 SIZE_{it} + \varepsilon_{it} \quad \text{.....(6)}$$

The validity of the FD-GMM model in this study was tested using several diagnostic procedures to ensure the reliability of the estimates. The Arellano–Bond AR(1) and AR(2) tests were used to detect autocorrelation in the residuals, where the presence of first-order autocorrelation (AR(1)) is still tolerable in a dynamic panel model, while the absence of second-order autocorrelation (AR(2)) indicates that the model is well-specified. Furthermore, the Hansen test is used to test the validity and exogeneity of the instruments used in the estimation, thereby ensuring that the instruments are not correlated with the error term.

In addition, this study employs a two-step robust standard errors approach to address potential heteroscedasticity and improve estimation efficiency. The instrument collapse technique is also used to limit the number of instruments and prevent instrument proliferation, which can lead to overfitting and weaken the power of the Hansen test. This study combines the Fixed Effects Model (FEM) and First-Difference GMM (FD-GMM) approaches to produce more comprehensive and reliable estimates. The FEM approach is capable of controlling for

unobserved heterogeneity that is time-invariant, while FD-GMM effectively addresses potential endogeneity, model dynamics, and the possibility of persistence in corporate tax avoidance behavior. Therefore, the combination of these two methods provides confidence that the research results are robust, consistent, and capable of reflecting relationships that more closely approximate actual empirical conditions.

4. RESULT

4.1. Event Study

To provide an initial overview of the data, descriptive statistics for all variables used in this study are presented. This analysis aims to summarize the distribution, central tendency, and variability of the sample, offering a foundational understanding prior to conducting further regression analyses. The results are shown in Table 4

Table 2: Descriptive Statistics.
Source: Processed data using EViews 14 (2026).

VARIABLES	N	Minimum	Maximum	Mean	SD
Cash Effective Tax Rate (CASH_ETR)	436	0.000	1.000	0.236	0.179
Book-Tax Differences (BTD)	436	- 0.278	0.324	0.004	0.045
GAAP Effective Tax Rate (GAAP_ETR)	436	0.000	1.060	0.233	0.141
Environmental, Social, and Governance (ESG)	436	8.162	89.020	48.047	18.560
Digital Transformation (DT)	436	0.000	5.136	1.848	1.384
Profitability (ROA)	436	- 0.000	0.583	0.093	0.087
Leverage (DER)	436	0.062	4.949	0.455	0.289
Firm Size (SIZE)	436	26.216	34.536	31.200	1.047

Table 4 presents the descriptive statistics for all variables used in this study, including the dependent variable (tax avoidance), independent variables (Environmental, Social, and Governance/ESG performance and digital transformation), and control variables (profitability, leverage, and firm size). The sample consists of 463 firm-year observations from non-financial companies listed on the Indonesia Stock Exchange during the 2015–2024 period. The results show that the mean value of the Cash Effective Tax Rate (CASH_ETR) is 0.236 with a standard deviation of 0.179, indicating that, on average, firms pay approximately 23.6% of their pre-tax income as cash taxes. The minimum value of 0 suggests that some firms did not make cash tax payments in certain years, while the maximum value of 1.000 indicates cases where tax payments are relatively high compared to pre-tax income. The relatively high standard deviation reflects substantial variation in tax payment behavior across firms.

For the Book–Tax Differences (BTD), the mean value is 0.004 with a standard deviation of 0.045. The near-zero mean suggests that, on average, the difference between accounting income and taxable income is relatively small. However, the range from −0.278 to 0.324 indicates considerable variation in tax planning practices among firms. Similarly, the GAAP Effective Tax Rate (GAAP_ETR) has a mean value of 0.233 with a standard deviation of 0.141, indicating that firms recognize accounting tax expenses of approximately 23.3% of pre-tax income. The maximum value of 1.060 suggests that, in some cases, recognized tax expenses exceed pre-tax income, which may reflect accounting adjustments or deferred tax components.

Regarding the independent variables, ESG performance has an average score of 48.047 with a standard deviation of 18.560, indicating that ESG practices among non-financial firms in Indonesia are generally at a moderate level, with considerable variation across firms. The second independent variable, Digital Transformation (DT), has a mean value of 1.848 with a standard deviation of 1.384, suggesting varying levels of digital adoption across firms. The minimum value of 0 indicates that some firms still have limited digital transformation initiatives, while the maximum value of 5.136 reflects firms with relatively advanced levels of digitalization.

For the control variables, profitability (ROA) has an average value of 0.093, indicating that firms generate an average return of 9.3% on total assets. Leverage (DER) has a mean value of 0.455, reflecting a moderate level of debt usage relative to equity. Meanwhile, firm size (SIZE) has an average value of 31.200 with relatively low dispersion, indicating that most firms in the sample are classified as large firms based on total assets. Overall, the descriptive statistics show sufficient variation across all variables, suggesting that the data are suitable for further econometric analysis to examine the relationship between ESG performance, digital transformation, and tax avoidance.

Following the descriptive statistics, panel data

regression analysis is employed to examine the relationship between ESG performance, digital transformation, and tax avoidance. Three panel data models are considered: the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM). To determine the most appropriate model, the Chow test and Hausman test are conducted. The Chow test results indicate that the probability values for all tax avoidance proxies (CASH_ETR, BTD, and GAAP_ETR) are 0.0000, which are below the 5% significance level. This result suggests that the Fixed Effect Model is more appropriate than the Common Effect Model. Furthermore, the Hausman test results show probability values of 0.0001 for CASH_ETR, 0.0012 for BTD, and 0.0045 for GAAP_ETR, all of which are below the 5% significance level. These findings confirm that the Fixed Effect Model is the most suitable specification for the panel data in this study.

Based on the model specification tests, the Fixed Effect Model (FEM) is selected as the baseline model to estimate the relationship between ESG performance, digital transformation, and tax avoidance. The regression results are presented in Table 5. The findings indicate that ESG performance does not have a statistically significant effect (at the 5% level) on tax avoidance across all proxies used in this study (CASH_ETR, BTD, and GAAP_ETR). However, ESG shows a positive and marginally significant effect at the 10% level on GAAP_ETR. Similarly, digital transformation does not exhibit a significant effect on tax avoidance in the baseline model. Among the control variables, profitability (ROA) consistently shows a significant relationship with tax avoidance across several specifications. Specifically, ROA has a negative and significant effect on CASH_ETR and GAAP_ETR, indicating that more profitable firms tend to report lower effective tax rates, while it shows a positive effect on BTD. Meanwhile, leverage (DER) and firm size (SIZE) exhibit mixed results depending on the tax avoidance proxy used.

Table 3: Baseline Regression Results (Fixed Effect Model).
Source: Processed data using EViews 14 (2026).

Variable Estimation	**Model FEM_CASH_ETR**		**Model FEM _BTD**		**Model FEM_GAAP_ETR**	
	Coeff.	Prob.	Coeff.	Prob.	Coeff.	Prob.
Constanta	0.5747	0.4919	- 0.5307	0.0025	- 0.6917	0.2827
Environmental, Social, and Governance (ESG)	- 0.0014	0.1050	0.0001	0.4715	0.0013	0.0532*
Digital Transformation (DT)	- 0.0035	0.7043	0.0002	0.9227	0.0067	0.3486
Profitability (ROA)	- 0.8266	0.0000**	0.2662	0.0000**	- 0.6785	0.0000**
Leverage (DER)	- 0.0171	0.6179	0.0102	0.1546	- 0.0445	0.0919
Firm Size (SIZE)	- 0.0057	0.8340	0.0164	0.0043**	- 0.0104	0.6205
R2	0.5351		0.6778		0.5564	
Adjusted R2	0.4421		0.6133		0.4677	
F-Statistic	5.7542		10.5176		6.2716	
Prob (F-Statistic)	0.0000		0.0000		0.0000	

Table 4: Robustness Test: First-Difference GMM Estimation.
Source: Processed data using EViews 14 (2026).

Variable Estimation	**Model FEM_CASH_ETR**		**Model FEM _BTD**		**Model FEM_GAAP_ETR**	
	Coeff.	Prob.	Coeff.	Prob.	Coeff.	Prob.
Constata	- 0.2622	0.0000**	0.1451	0.0000	0.0529	0.1325
Environmental, Social, and Governance (ESG)	- 0.0035	0.0022**	- 0.0004	0.0752*	0.0001	0.8043
Digital Transformation (DT)	- 0.0183	0.0252**	- 0.0005	0.1286	0.0001	0.9792
Profitability (ROA)	- 1.3644	0.0000**	0.2368	0.0000**	- 0.6659	0.0000**
Leverage (DER)	- 0.0595	0.4233	- 0.0178	0.3905	0.1173	0.0554*
Firm Size (SIZE)	0.1013	0.0409**	- 0.0218	0.0646	0.0044	0.8352

Table 5: Diagnostic Tests.
Source: Processed data using EViews 14 (2026).

Test	**CASH_ETR**	**BTD**	**GAAP_ETR**
Hasen test (p-value)	0.2887	0.4751	0.5469
AR (1) (p-value)	0.0387	0.0736	0.0096
AR (2) (p-value)	0.0547	0.2557	0.3468

To address potential endogeneity issues and ensure the robustness of the estimation results, a dynamic panel model was subsequently estimated using the First-Difference Generalized Method of Moments (FD-GMM). Endogeneity may arise due to the possibility of reverse causality, where firms engaging in tax avoidance allocate additional resources to improve their ESG performance. The validity of the instrumental variables was tested using the Hansen test. The results show Hansen J-statistic probability values of 0.2887, 0.4751, and 0.5469 for the CASH_ETR, BTD, and GAAP_ETR models, respectively, indicating that the instruments used are valid. Furthermore, the Arellano–Bond test was employed to detect autocorrelation in the GMM estimation. The results indicate the presence of AR(1), which is common in dynamic panel estimations, while the probability values of AR(2) are above the 5% significance level, confirming the absence of second-order autocorrelation.

The results presented in Table 6 indicate that ESG performance has a negative and significant effect on tax avoidance when measured using CASH_ETR ($\beta = -0.0035$; $p < 0.05$). This finding suggests that firms with better ESG performance tend to exhibit lower levels of tax avoidance. However, ESG does not show a statistically significant effect when tax avoidance is proxied by GAAP_ETR, but it exhibits a negative and marginally significant effect at the 10% level on BTD, indicating that the impact of ESG depends on the measurement of tax avoidance. Digital transformation also shows a significant negative effect on CASH_ETR ($\beta = -0.0183$; $p < 0.05$), implying that higher levels of digitalization enhance transparency and strengthen internal control systems, thereby constraining tax avoidance practices.

Regarding the control variables, profitability (ROA) remains statistically significant across all models, confirming its role as an important determinant of corporate tax avoidance. Leverage (DER) shows a positive and marginally significant effect at the 10% level in the GAAP_ETR model, while firm size (SIZE) exhibits a positive and significant effect on CASH_ETR. Overall, the GMM estimation provides additional evidence that ESG performance and digital transformation play important roles in influencing corporate tax avoidance, particularly when tax avoidance is measured using cash-based indicators.

5. DISCUSSION

5.1. ESG Performance and Tax Avoidance

This study examines the relationship between Environmental, Social, and Governance (ESG) performance and corporate tax avoidance using three proxies: the Cash Effective Tax Rate (CASH_ETR), Book–Tax Differences (BTD), and the GAAP Effective Tax Rate (GAAP_ETR). The use of these proxies allows for a more comprehensive assessment of corporate tax behavior. Empirical results from the Fixed Effects Model (FEM) indicate that ESG performance does not have a significant effect on CASH_ETR and BTD, but has a significant positive effect on GAAP_ETR at the 10% significance level. Meanwhile, robustness test results using First-Difference GMM indicate that ESG performance has a significant negative effect on CASH_ETR, as well as a marginal negative effect on BTD, but does not significantly affect GAAP_ETR. These findings suggest that the relationship between ESG and tax avoidance is inconsistent and highly dependent on the estimation method and measurement proxies used.

Based on the stakeholder perspective, companies with high ESG performance tend to maintain their reputation and stakeholder trust through more responsible business practices, including in the area of taxation (Kim et al., 2018; Luo et al., 2023). This is reflected in the GMM results, where ESG was found to reduce tax avoidance in both cash-based and book-to-tax difference measures. Furthermore, companies with strong ESG performance generally have better access to financing and lower capital costs, thereby reducing the incentive to engage in aggressive tax avoidance (Pastor et al., 2021). However, the positive result for GAAP_ETR in the FEM model suggests the possibility of a different relationship when tax avoidance is measured on an accounting basis. A higher GAAP_ETR can be interpreted as a higher tax payment rate, so this result remains consistent with the argument that companies with high ESG scores tend to be more fiscally compliant. On the other hand, the lack of significance in the GMM model indicates that the relationship is not strong enough after accounting for potential endogeneity.

The differences in results among these proxies can be explained by the characteristics of each measure. CASH_ETR reflects actual tax payments, whereas BTD and GAAP_ETR are more influenced by accrual components such as deferred taxes and accounting policies. Therefore, the relationship between ESG and tax avoidance is more clearly evident in cash-based measures than in accounting-based ones. Furthermore, the possibility of window-dressing practices cannot be ignored, where companies enhance their ESG disclosures without substantively altering their tax behavior (Yanto et al., 2025).

Overall, these findings suggest that ESG performance tends to contribute to improved tax compliance, particularly in the form of actual tax payments, although this effect is not consistent across all proxies and estimation methods. This underscores that the relationship between ESG and tax avoidance is complex and requires diverse measurement approaches to obtain a more comprehensive picture.

5.2. Digital Transformation and Tax Avoidance

The results of the empirical tests indicate that digital transformation does not have a consistent and statistically significant effect in the baseline model. However, robustness test results using the First-Difference GMM approach indicate that digital transformation has a significant negative effect on tax avoidance when measured using CASH_ETR, while remaining insignificant in the BTD and GAAP_ETR models. These findings suggest that the role of digital transformation in influencing corporate tax behavior is partial and depends on the measurement proxy used.

In the perspective of Agency Theory and Stakeholder Theory, digital transformation can be understood as a mechanism that strengthens oversight and enhances corporate transparency. Digital systems such as enterprise resource planning, data analytics, and automated reporting can reduce information asymmetry between managers and owners, thereby limiting opportunistic behavior including tax avoidance while encouraging companies to be more accountable to stakeholder demands. However, the results of this study indicate that this role does not consistently reduce tax avoidance across all measurement proxies, suggesting that the effectiveness of digital transformation remains dependent on the characteristics of the measurement and the company's operational context.

Digitalization also plays a crucial role in reducing information asymmetry between managers and stakeholders. By enhancing the availability, accuracy, and traceability of financial information, digital systems strengthen stakeholders' ability to monitor corporate activities (Zhao & Chai, 2023; Zhang & She, 2024). In line with agency theory, this enhanced oversight function is expected to limit managerial discretion in engaging in aggressive tax planning. The significant negative effect found in the CASH_ETR model during robustness tests supports this argument, indicating that digital transformation can serve as a governance mechanism that curbs opportunistic behavior in tax avoidance, particularly in cash-based measurements. In the context of corporate taxation, digital technology enhances the traceability of transactions and strengthens the reliability of financial reporting systems. This reduces the likelihood of companies engaging in aggressive tax avoidance strategies, as such activities become easier to detect (Chen et al., 2024). Consequently, companies with higher levels of digitalization will face greater reputational and regulatory risks if they engage in tax avoidance practices. This effect is becoming increasingly relevant in the context of developing countries such as Indonesia, where digital transformation can compensate for limitations in regulatory enforcement and institutional oversight (Damayanti et al., 2025)

However, the insignificant results for the BTD and GAAP_ETR models suggest that the impact of digital transformation does not apply across all dimensions of tax avoidance. These two proxies are more closely related to accrual-based accounting policies and discretionary reporting practices, which are not directly influenced by increased operational transparency. Therefore, although digital transformation improves the quality of governance and oversight, its effectiveness in curbing tax avoidance appears to be stronger in real cash-based tax behavior compared to accrual-based measures. This finding has important implications: companies need to integrate digital transformation as part of their governance strategy to minimize tax avoidance practices through increased transparency and accountability. Furthermore, optimizing digital systems particularly those related to cash flows and actual transactions can strengthen internal oversight, limit opportunistic managerial behavior, and enhance stakeholder trust.

5.3. The Role of Firm Characteristics

In addition to Environmental, Social, and Governance (ESG) performance and digital transformation as the main variables, the results of this study indicate that firm characteristics also influence tax avoidance behavior. The control variables used namely profitability, leverage, and firm size exhibit diverse patterns of influence across various tax avoidance proxies, both in the fixed-effects model and in the First-Difference GMM robustness tests. This indicates that a firm's tax decisions result from the interaction between its strategies and its underlying fundamental conditions. Theoretically, these findings can be understood through the integration of Agency Theory and Stakeholder Theory. A company's decisions regarding tax policy are inseparable from the conflict of interest between managers and

shareholders, which drives managers to optimize financial performance while simultaneously considering the risks involved. On the other hand, pressure from stakeholders demands that companies maintain their legitimacy and reputation through more transparent and responsible practices. In this context, a company's ability to manage its internal resources and capabilities becomes a critical factor in determining how tax strategies are designed and effectively implemented.

Between the three variables, profitability measured by return on assets (ROA) shows the most consistent and significant influence. Companies with higher profitability levels tend to have greater incentives to manage their tax burden. However, the results of this study indicate that companies do not always engage in aggressive tax avoidance; rather, they tend to balance tax efficiency and compliance, so that more profitable companies are actually more cautious in determining their tax strategies. Different from profitability, leverage shows a relatively limited and inconsistent effect. Although debt can theoretically provide benefits in the form of an interest tax shield, empirical results indicate that leverage is not a primary factor in driving tax avoidance. This suggests that the monitoring function of creditors can limit opportunistic managerial behavior, causing companies to be more cautious in implementing their tax strategies.

Meanwhile, firm size yields mixed results and does not appear to be a dominant factor. Although large firms face a higher level of scrutiny, the findings of this study suggest that firm size alone is insufficient to determine tax avoidance behavior. This indicates that other factors, such as corporate strategy and internal capabilities, play a more significant role than firm size alone. Overall, these findings have important implications: companies need to consider the balance between financial performance and tax compliance when formulating their business strategies. Highly profitable firms are advised not only to focus on tax efficiency but also to maintain transparency and legitimacy in the eyes of stakeholders. Furthermore, the role of leverage as a disciplinary mechanism highlights the importance of external oversight in curbing opportunistic managerial behavior, so firms need to manage their capital structure wisely.

CONCLUSION

This study aims to analyze the impact of Environmental, Social, and Governance (ESG) performance and digital transformation on tax avoidance, while controlling for firm characteristics. Using the Fixed Effects Model (FEM) and the Generalized Method of Moments (GMM), this study provides a more comprehensive understanding of the determinants of corporate tax avoidance. Based on the FEM estimation results, ESG performance and digital transformation generally do not show a significant effect on tax avoidance across most proxies. ESG only shows a positive effect at the 10% significance level on GAAP_ETR, while digital transformation does not have a significant effect in any of the models. This indicates that, statistically, neither sustainability commitments nor digital capabilities have consistently influenced corporate tax avoidance behavior.

However, the results of robustness testing using the First-Difference GMM approach revealed stronger findings. ESG and digital transformation were found to have a significant negative effect on CASH_ETR, indicating that improvements in ESG performance and digital capabilities are associated with a decrease in the level of cash-based tax avoidance. Additionally, ESG also exhibits a negative effect at the 10% significance level on BTD, while digital transformation does not show a significant effect on that proxy. As for GAAP_ETR, neither ESG nor digital transformation demonstrates a significant effect. The control variables showed relatively consistent results, with profitability having a significant effect on all tax avoidance proxies. Leverage and firm size exhibited varying effects across models, thus failing to provide a consistent pattern.

Overall, this study shows that the effects of ESG and digital transformation on tax avoidance are inconsistent across proxies and estimation methods. However, the GMM approach reveals a stronger relationship, thereby underscoring the importance of accounting for potential endogeneity in panel data analysis. These findings also support the Stakeholder and Agency theoretical perspectives, which emphasize that corporate tax behavior is influenced by the interaction between sustainability commitments, governance mechanisms, and technological capabilities. Nevertheless, this study has limitations regarding the observation period and data availability. Therefore, future research is recommended to extend the study period, use additional proxies, and develop more diverse methodological approaches to obtain more comprehensive results.

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