

ESG MODERATION OF TAX AVOIDANCE AND DISTRESS-RELATED FINANCIAL CONSTRAINTS IN INDONESIAN FIRM VALUATION

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Abstract

Tax avoidance, financial vulnerability, and environmental, social, and governance (ESG) ratings may jointly inform firm valuation. This study examines their associations among nonfinancial Indonesian listed firms during 2019–2023. An unbalanced panel of 256 firm-years from 66 firms is estimated using firm and year fixed effects, firm-clustered standard errors, and restricted wild cluster bootstrap tests. Tax avoidance is measured by negative as-reported GAAP effective tax rates, and distress-related financial constraints (FC) by a modified accounting index excluding market equity. Greater constraints are associated with lower Tobin's Q at mean ESG (coefficient -1.139 ; clustered $p = 0.004$; Holm-adjusted bootstrap $p = 0.012$). The primary tax hypothesis and both ESG moderation hypotheses are unsupported at 5%. A standardized-tax-field sensitivity produces a positive tax coefficient ($p = 0.031$), contrary to the negative prediction. FC inference varies with outlier processing; lagged regressors and a loss-inclusive companion model also yield nonsignificant estimates. Matched Refinitiv and Bloomberg models provide insufficient evidence of moderation. The contribution is measurement-specific Indonesian evidence on accounting vulnerability, tax-field comparability, and ESG-provider sensitivity. The estimates describe contemporaneous associations and do not identify causal financing effects.

Keywords: ESG ratings; financial constraints; firm value; Indonesia; tax avoidance

INTRODUCTION

Tax avoidance and financial constraints raise a common valuation question: whether resources retained by a firm translate into benefits for shareholders. Lower tax burdens can preserve funds, while financing pressure can restrict their productive use. Investors may also assess these decisions in light of a firm's environmental, social, and governance (ESG) commitments. A higher ESG rating could sustain stakeholder confidence, but maintaining those commitments can require resources that financially vulnerable firms lack. Consequently, neither a tax-saving benefit nor an ESG buffering role can be assumed to apply uniformly across firms.

Desai and Dharmapala (2009) show that the valuation of tax avoidance depends on governance, and Edwards, Schwab, and Shevlin (2016) connect financing constraints to cash savings from tax planning. Two frameworks motivate the present questions. Elamer, Boulhaga, and Ibrahim (2024) examine ESG moderation of the tax avoidance–valuation relationship among French listed firms during 2012–2021, using cash ETR and alternative tax measures. Ho, Nguyen, and Dang (2024) examine contingencies in the ESG–performance relationship across 31 countries during 2002–2018, including financing constraints. This study adapts their research questions to one Indonesian valuation equation containing both financial characteristics and both ESG interactions.

The Indonesian setting makes measurement central to this extension. The general corporate income-tax rate was 25% in 2019 and 22% during 2020–2023; qualifying publicly listed companies can receive rate relief (Direktorat Jenderal Pajak, n.d.). Statutory relief and income composition therefore complicate interpreting a lower effective tax rate (ETR) as discretionary avoidance. Final taxes, or PPh final, create an additional accounting issue. Bregina and Martani (2019) document differences in their presentation among Indonesian construction and real estate firms and consequences for tax ratios. Matching the scope of income-tax expense and pretax income is necessary for a consistent annual ETR; it does not recover a complete measure of all taxes borne by the firm. Sustainability information also became institutionally salient under the sustainable-finance and reporting requirements of POJK 51/POJK.03/2017 (Otoritas Jasa Keuangan, 2017). Reporting obligations and vendor ESG ratings nevertheless remain distinct. Indonesian studies already address tax, sustainability, and valuation. Rudyanto and Pirzada (2021) find that the sustainability-reporting contingency varies with tax measurement and environmental sensitivity. Fitriyana and Putra (2026) examine tax avoidance, financial distress, ESG, and firm

value in 175 observations during 2020–2024, reporting an insignificant tax association, a negative distress association, and an ESG buffering interaction. Combining these four variables on the Indonesia Stock Exchange (IDX) is therefore insufficient to establish novelty. A useful extension must identify what its tax and constraint measures capture and make comparisons that separate provider coverage, operational definitions, and inference. The contribution has three parts. First, a matched as-reported tax-expense and pretax-income basis documents the consequences of switching to standardized vendor fields in Indonesia's final-tax context. Second, the accounting FC proxy excludes market equity, avoiding its direct overlap with Tobin's Q; the shared asset denominator remains a limitation. Third, Refinitiv and Bloomberg ESG scores are compared on identical financial observations. Firm and year effects, clustered inference, and explicit sensitivities assess the scope of these established valuation relationships in Indonesia. The primary panel comprises 256 observations from 66 nonfinancial IDX companies during 2019–2023. Greater distress-related financial constraints are associated with lower contemporaneous Q at the mean ESG rating, including under bootstrap and multiple-testing adjustment. The primary tax hypothesis and both ESG moderation hypotheses are unsupported. Companion analyses show that statistical evidence is weaker with lagged regressors and when loss years are included in a model excluding the tax block. These findings motivate attention to accounting vulnerability and tax-field definitions when ESG ratings are used to interpret firm valuations.

LITERATURE REVIEW

Agency theory explains why retaining resources need not benefit shareholders when managers control their allocation (Jensen & Meckling, 1976). Tax savings may finance productive investment, but complex tax arrangements can also obscure resource use and facilitate managerial appropriation. Stakeholder theory broadens the relevant relationships to employees, customers, suppliers, capital providers, and other affected parties. Donaldson and Preston (1995) distinguish its normative foundations from instrumental propositions about corporate outcomes. The instrumental argument used here concerns whether credible commitments sustain cooperation and confidence that investors value. These perspectives generate competing predictions. ESG credibility could temper concerns about tax decisions or financial vulnerability. Resource pressure could instead make commitments costly or difficult to sustain when operating capacity deteriorates. An ESG rating measures neither tax responsibility nor the spending needed to maintain ESG activities directly. Stakeholder trust, managerial incentives, and expenditure channels motivate the hypotheses; the dataset does not identify those mechanisms separately.

Tax avoidance and firm value

Tax avoidance broadly concerns the reduction of explicit taxes (Hanlon & Heitzman, 2010). It covers practices with different degrees of discretion and risk and is not synonymous with illegal evasion. Here, the proxy is negative GAAP ETR, so a higher value indicates a lower recognized income-tax burden. Tax incentives, recognition of deferred taxes, and income composition can change this measure without a change in discretionary tax planning. A lower tax burden can preserve funds for investment or distributions. The competing cost argument emphasizes opacity, agency problems, and uncertainty about the durability of savings. Balakrishnan, Blouin, and Guay (2019) associate aggressive tax planning with lower transparency; Desai and Dharmapala (2009) demonstrate the importance of governance for valuation. H1 selects the cost channel and tests its negative conditional association at mean ESG.

H1 Tax avoidance is negatively associated with firm value.

Financial constraints and firm value

Financial constraints are frictions that limit obtaining funds on acceptable terms. They can affect firms with attractive investment opportunities as well as firms with weak financial health. Whited and Wu (2006, p. 534) distinguish financing restrictions on growth from near-bankruptcy conditions. Thus, accounting distress and external financing constraints are related but not interchangeable. Weak accounting performance does not directly establish that a lender rejected a funding application. This study examines the distress-related channel using a continuous accounting index combining working capital, retained earnings, EBIT, and revenue relative to assets. Deterioration in those conditions may weaken internal resources, operating capacity, and the financial position supporting continued funding. The score adapts the market-equity-free measure described by Leary and Roberts (2005, p. 2587), which follows the modified Altman approach used in MacKie-Mason (1990). Reversing its sign makes higher values indicate greater distress-related constraints. It is neither a direct measure of credit access nor an Indonesian-calibrated bankruptcy probability. Investors may assign lower valuations when financial vulnerability threatens operations and investment. The prediction is therefore negative for the reversed index and Q.

The index also embeds operating fundamentals relevant to valuation, so the interpretation concerns the specified distress-related channel.

H2 Distress-related financial constraints are negatively associated with firm value.

ESG moderation of the tax avoidance relationship

Higher ESG ratings may change investors' assessment of a lower tax burden. If ratings reflect credible commitments and oversight, they may reduce concerns that retained resources will be diverted or that tax decisions conflict with broader responsibilities. Godfrey (2005) develops a moral-capital argument through which corporate philanthropy can protect stakeholder relationships. This provides a conceptual analogy for attenuation of a valuation discount; it is not empirical proof that an ESG score insures firms against tax-related costs. Elamer et al. (2024) motivate testing ESG–tax interactions. Their negative ETR-by-ESG coefficient becomes positive if that ETR variable is recoded as minus ETR. Their substantive interpretation also discusses a reduced ESG valuation premium in association with avoidance, so coding equivalence does not settle the mechanism. H3 instead follows the stakeholder-confidence argument: with higher TA denoting lower ETR, attenuation of the negative slope proposed in H1 corresponds to a positive TA-by-ESG coefficient. A competing interpretation is that highly visible sustainability commitments increase scrutiny of tax practices. Nasih, Harymawan, Abdul Rasid, and Putra (2024) find evidence consistent with impression management in Indonesian sustainability reporting, showing why reporting cannot automatically certify responsible tax behavior. These opposing channels justify an empirical interaction test. A significant main tax coefficient is not a prerequisite for moderation because the interaction addresses how the conditional slope changes with ESG.

H3 Higher ESG ratings weaken the hypothesized negative association between tax avoidance and firm value.

ESG moderation of the financial constraints relationship

ESG commitments could support financially vulnerable firms by sustaining stakeholder relationships. Cheng, Ioannou, and Serafeim (2014) associate stronger corporate social responsibility performance with better access to finance. Yadav and Asongu (2025) report an ESG buffering relationship in India, and Fitriyana and Putra (2026) report attenuation of the distress association in Indonesia. These findings motivate a competing buffering mechanism, although their measures and designs differ from the accounting-based proxy used here. The resource-pressure mechanism motivates H4. Environmental and social activities may require funding before benefits materialize. Maintaining these commitments may become difficult as operating capacity and internal resources weaken. Ho et al. (2024) report a negative financing-constraints interaction with ESG using the Kaplan-Zingales index. In a linear interaction model, a weaker ESG association as FC rises is equivalent to a more negative FC slope as ESG rises. The negative prediction adapts this mechanism to the distress-related proxy used here. Ariff, Kamarudin, Musa, and Mohamad (2024) provide complementary cross-country evidence from 49 countries during 2011–2020 that financing constraints weaken the positive tax avoidance–ESG relationship. Their outcome is ESG performance, rather than Q, so the evidence motivates financing contingencies without establishing H4. The present model does not observe ESG expenditure and treats the resource-pressure explanation as a hypothesis, alongside the competing stakeholder-support explanation.

H4 Higher ESG ratings strengthen the hypothesized negative association between distress-related financial constraints and firm value.

The remaining question is whether established valuation contingencies transfer to an integrated Indonesian equation when the tax-field basis, market-value overlap, and ESG provider are explicit. The study evaluates matched as-reported ETR, an accounting FC proxy excluding market equity, and two ESG providers on common observations. All four hypotheses retain their theoretical directions.

METHOD

Research design and data

The study uses secondary accounting, market, and ESG data for nonfinancial IDX companies in the 2019–2023 fiscal-year research window. Financial and ESG series for this window were re-extracted in 2026. LSEG financial and Refinitiv ESG extracts are dated September 29, 2026; Bloomberg ESG data are dated September 30, and Bloomberg ETR data for an exploratory diagnostic are dated October 1. These historical series can incorporate subsequent vendor revisions. Prior-year observations support revenue growth and lags. FY2024 is outside the primary window and is used only for an exploratory extension. The primary source group contains 90 nonfinancial issuers with at least one Refinitiv ESG observation in the supplied 2018–2025 coverage window. Eligible firm-

years must fall within 2019–2023, be listed at year-end, have an ESG score and a valid market-date flag, and have positive assets, Q, and as-reported pretax income. All primary variables and six controls must be finite and complete. Firms contribute at least two eligible observations. This is an availability-based panel, not a random sample of the IDX, and years need not be consecutive.

Positive pretax income is required because annual GAAP ETR becomes difficult to interpret with a nonpositive denominator. Loss years are excluded, while firms with other eligible profitable years remain. This criterion limits the integrated tax model's population. A companion model omits TA and TA × ESG and includes loss years to examine sample coverage.

Variable definitions and preprocessing

Firm value is proxied by an approximation of Tobin's Q equal to market capitalization plus total liabilities, divided by total assets. Market capitalization and the corresponding balance-sheet values are expressed in IDR. The approximation uses book assets rather than replacement cost and includes non-interest-bearing liabilities.

$$Q_{it} = \frac{MVE_{it} + TL_{it}}{A_{it}} \quad (1)$$

TA equals negative GAAP ETR, using a matched pair of as-reported income-tax expense and pretax income. Higher TA indicates a lower recognized income-tax burden. Final tax presented above pretax income is outside this income-tax-line numerator. A matched standardized vendor-field pair is evaluated separately. Negative ETRs are retained before winsorization because a tax benefit can occur in a profitable year.

$$TA_{it} = -\frac{\text{Income tax expense}_{it}}{\text{Pretax income}_{it}} \quad (2)$$

FC reverses a modified accounting Z formula excluding market equity and uses LSEG Revenue from Business Activities - Total as its sales input. Total business revenue captures operating revenue across heterogeneous nonfinancial activities; net sales of goods and services is evaluated separately. The formula adapts Leary and Roberts (2005, p. 2587) and the MacKie-Mason (1990) precursor to Altman (1968). It is used continuously without bankruptcy thresholds or claims of classification accuracy.

$$FC_{it} = -\frac{1.2(CA - CL) + 1.4RE + 3.3EBIT + REV}{A} \quad (3)$$

In Equation (3), CA and CL are current assets and liabilities, RE is retained earnings, REV is total business revenue, and A is total assets; all inputs refer to firm *i* in fiscal year *t*. Accounting ratios use inputs in the same reporting currency. FC excludes market equity but shares total assets as a denominator with Q. Greater, including less negative, FC values indicate weaker accounting conditions under the specified score. The primary ESG variable is Refinitiv ESG Score divided by 100. It is distinct from ESG Combined Score and disclosure scores. The matched-provider analysis uses Bloomberg BESG ESG Score. Six controls are included: SIZE, the logarithm of total assets in IDR; ROA, consolidated net income divided by assets; LEV, interest-bearing debt including leases divided by assets; GROWTH, annual total business revenue growth; LIQ, current assets divided by current liabilities; and AGE, the logarithm of fiscal year minus incorporation year. LEV differs from total liabilities divided by assets in the Q numerator. Missing primary inputs are not imputed. Q, TA, FC, ROA, LEV, GROWTH, and LIQ are winsorized at the pooled estimation sample's 1st and 99th percentiles using linear interpolation. ESG and the logarithmic controls are not winsorized. TA, FC, and ESG are mean-centered after preprocessing, then their interactions are formed. Alternative specifications generally use their own eligible samples, pooled cutoffs, and centering means; the ESG-provider comparison holds financial processing constant across providers within its matched sample. Appendix A identifies the source columns and Appendix B describes reproducibility details.

Empirical specification and inference

The integrated model includes both financial variables, ESG, both ESG interactions, six controls, firm fixed effects, and year fixed effects. Superscript *c* denotes mean centering, X contains the controls, α denotes firm effects, and λ denotes year effects.

$$Q_{it} = \alpha_i + \lambda_t + \beta_1 TA_{it}^c + \beta_2 FC_{it}^c + \beta_3 ESG_{it}^c + \beta_4 (TA_{it}^c \times ESG_{it}^c) + \beta_5 (FC_{it}^c \times ESG_{it}^c) + \gamma' X_{it} + \varepsilon_{it} \quad (4)$$

TA and FC coefficients are conditional associations at mean ESG; the ESG coefficient is evaluated at mean TA and FC. H1 predicts β₁ < 0, H2 β₂ < 0, H3 β₄ > 0, and H4 β₅ < 0. All coefficient tests are two-sided, with 5% the primary threshold. Support requires the predicted direction and statistical evidence. Centering changes the main effects' reference points while preserving the fitted interaction model.

Firm effects allow persistent unobserved differences to correlate with the regressors; year effects account for common annual conditions. Inference uses firm-clustered CR1 standard errors, a finite-sample adjustment counting

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the full fixed-effects design rank, and a t distribution with $G - 1$ degrees of freedom. Restricted wild cluster bootstrap- t tests (Cameron, Gelbach, & Miller, 2008) use 9,999 Rademacher draws, with guidance from MacKinnon, Nielsen, and Webb (2023). Holm adjustment (Holm, 1979) is applied across the four primary hypothesis coefficients. Exploratory sensitivity p -values are distinguished from this primary testing family. Estimation, auditing, and table generation use Python with NumPy, SciPy, pandas, and linearmodels. Panel diagnostics assess different restrictions. The firm-effects F test, commonly called the Chow test, compares pooled and firm-effect models; the Breusch-Pagan LM test compares pooled and random-effects models. A conventional Hausman diagnostic compares FE and RE slope estimates under classical covariance assumptions. Cluster-robust correlated-random-effects diagnostics following Mundlak (1978) include firm means of economic regressors and year indicators. Including year-indicator means accounts for differing observation patterns in an unbalanced panel (Wooldridge, 2019). These tests inform the specification; they do not establish ignorable sample selection or causal identification.

RESULT AND DISCUSSION

Sample selection and characteristics

Table 1 presents sequential sample selection. The unbalanced panel contains 256 observations from 66 nonfinancial firms. Annual counts are 37, 38, 52, 65, and 64 for 2019–2023. Thirty-four firms contribute five years, five contribute four, 12 contribute three, and 15 contribute two. Eligibility remains conditional on ESG coverage, positive pretax income, and complete inputs.

Table 1. Sequential sample selection

Inclusion criterion	Firm-years retained	Firms retained	Firm-years excluded
Source universe in the 2019–2023 window	450	90	—
Listed at year-end	416	90	34
Available Refinitiv ESG rating	312	87	104
Valid market observation date	311	86	1
Positive as-reported pretax income	276	81	35
Positive assets and Q	276	81	0
Complete primary variables and six controls	268	78	8
At least two complete years per firm	256	66	12

Source: Calculations from LSEG (Refinitiv). Criteria are applied sequentially, so exclusion counts are not independent. The 90-firm source group contains issuers with at least one Refinitiv ESG rating in the supplied 2018–2025 coverage window; this does not imply continuous ESG coverage during 2019–2023.

Table 2 describes sector composition. Consumer Staples contains 13 firms, and Communication Services and Materials each contain 12. Together, these sectors account for 37 firms, or 56.06% of the sample. The GICS classification is a September 30, 2026 snapshot for descriptive use, not a historical sector assignment or a time-varying regression control.

Table 2 Sector composition of the estimation sample

GICS sector	Firms	Firms %	Firm-years	Firm-years %
Consumer Staples	13	19.70	50	19.53
Communication Services	12	18.18	49	19.14
Materials	12	18.18	49	19.14
Energy	9	13.64	36	14.06
Industrials	6	9.09	21	8.20
Consumer Discretionary	5	7.58	15	5.86

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GICS sector	Firms	Firms %	Firm-years	Firm-years %
Real Estate	5	7.58	20	7.81
Utilities	2	3.03	7	2.73
Health Care	1	1.52	5	1.95
Information Technology	1	1.52	4	1.56
Total	66	100.00	256	100.00

Source: Calculations from LSEG (Refinitiv). Percentages may differ from 100 by rounding.

Descriptive statistics

Table 3 reports processed variables before mean centering. Q averages 1.8394 with a median of 1.2302, indicating right skew. The mean TA is -0.2275 , equivalent to a winsorized mean ETR of 22.75%. FC averages -1.7509 ; less negative values indicate greater distress-related constraints under this continuous index. Refinitiv ESG averages 0.4964, or 49.64 on the original 0–100 scale.

Table 3. Descriptive statistics for the primary sample

Variable	Mean	SD	Minimum	Median	Maximum
Tobin's Q	1.8394	1.8570	0.4083	1.2302	12.3619
TA (–GAAP ETR)	-0.2275	0.1420	-0.7516	-0.2201	0.0182
FC (–modified Z)	-1.7509	1.0526	-4.6502	-1.5912	0.6854
ESG (0–1)	0.4964	0.1834	0.1100	0.4995	0.8738
SIZE	31.2108	1.0374	27.8965	31.1626	33.7300
ROA	0.0864	0.0792	0.0009	0.0625	0.4087
LEV	0.2396	0.1817	0.0000	0.2178	0.6932
GROWTH	0.1121	0.2748	-0.4622	0.0660	1.1520
LIQ	2.2022	1.7759	0.2444	1.7743	9.3924
AGE (log years)	3.5270	0.4694	1.9459	3.6376	4.4998

Source: Calculations from LSEG (Refinitiv). N = 256 for every variable. Q, TA, FC, ROA, LEV, GROWTH, and LIQ are winsorized at pooled 1st and 99th percentiles. SIZE and AGE are natural logarithms. ESG is divided by 100. FC is not a bankruptcy classification.

Mean ROA is 8.64%, debt leverage 23.96%, and annual revenue growth 11.21%. The current ratio has mean 2.2022 and median 1.7743. These pooled summaries differ from the identifying variation in the FE regression, which uses within-firm changes after removing common year effects.

Panel specification diagnostics

Table 4 distinguishes the restrictions tested by conventional and cluster-robust diagnostics. The firm-effects F test rejects pooling, and the LM test rejects a zero random-effect variance. The latter does not compare FE with RE. The raw Hausman covariance difference is indefinite and its usual chi-square reference is unreliable; its nominal p-value is therefore not used for estimator selection. A common-error-variance analogue gives $\chi^2(11) = 34.5470$, $p = 0.0003$. This classical diagnostic uses a common estimated error variance for the FE and RE covariance matrices.

Table 4. Panel specification and interaction diagnostics

Diagnostic	Statistic	df	p-value	Covariance basis
Firm-effects F test	10.5738	65, 175	<0.001	Classical
LM pooled versus RE	189.9744	1	<0.001	Classical
Hausman common-variance analogue	34.5470	11	0.0003	Classical
CRE economic means given year means	2.3056	11, 65	0.0187	Firm-clustered
CRE all firm means	2.1750	15, 65	0.0164	Firm-clustered
Joint year fixed effects	1.2424	4, 65	0.3018	Firm-clustered
Joint ESG interactions	1.0485	2, 65	0.3563	Firm-clustered

Source: Calculations from the primary sample, N = 256 and G = 66. LM and Hausman statistics use chi-square references; other rows report F statistics. The Hausman analogue tests eleven economic slopes, with year indicators included in estimation. CRE diagnostics include firm means of eleven regressors and four year indicators. Raw Hausman results are excluded because the covariance difference is not positive semidefinite. The CRE diagnostic rejects zero economic-regressor means conditional on year-indicator means ($p = 0.0187$); the joint test of all fifteen means gives $p = 0.0164$. An augmented pooled implementation with the same year means gives $p = 0.0846$ and 0.0906 , respectively. FE is retained because the question concerns within-firm associations and permits correlated firm heterogeneity. Year effects are retained to account for common conditions, although their joint p-value is 0.3018 . The joint ESG-interaction p-value is 0.3563 . All eleven economic regressors remain identified after absorption, and the maximum transformed-regressor VIF is 5.8816 . FC has the highest VIF; its EBIT/assets component overlaps with ROA (two-way residual correlation 0.8808), so its coefficient is conditional on net profitability.

Regression results and hypothesis testing

Table 5 reports the integrated firm and year FE regression. Main coefficients are evaluated at the relevant sample means, including ESG = 0.4964 . The economic regressors explain 24.88% of the Q variation remaining after both sets of fixed effects are removed.

Table 5. Firm and year fixed effects regression of Tobin's Q

Regressor	Coefficient	Clustered SE	p-value	95% confidence interval
TA	0.6342	0.4056	0.1227	[-0.1758, 1.4441]
FC	-1.1394	0.3868	0.0045	[-1.9119, -0.3669]
ESG	-2.5448	1.5808	0.1123	[-5.7020, 0.6123]
TA × ESG	1.9113	1.9267	0.3249	[-1.9365, 5.7591]
FC × ESG	1.4109	1.1447	0.2222	[-0.8752, 3.6970]
SIZE	0.1790	0.8193	0.8277	[-1.4572, 1.8153]
ROA	2.0273	2.8320	0.4767	[-3.6287, 7.6832]
LEV	2.7939	1.1891	0.0218	[0.4192, 5.1686]
GROWTH	-1.2225	0.6730	0.0739	[-2.5665, 0.1214]
LIQ	-0.3360	0.2416	0.1691	[-0.8184, 0.1465]
AGE	2.6653	2.7783	0.3409	[-2.8833, 8.2139]

Source: Calculations from LSEG (Refinitiv). Dependent variable: Q. N = 256; firms = 66; fiscal years = 2019–2023. Firm and year effects are included. Firm-clustered CR1 inference uses $t(65)$. TA, FC, and ESG are centered;

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controls are not. Partial R^2 after both sets of FE = 0.2488; overall R^2 including FE = 0.8988. Full design rank = 81; residual df = 175. TA has coefficient 0.6342, $p = 0.1227$, and 95% CI [-0.1758, 1.4441]. Its estimate is positive and not statistically significant at 5%, so H1's negative prediction is unsupported. FC has coefficient -1.1394, clustered SE 0.3868, $p = 0.0045$, and 95% CI [-1.9119, -0.3669]. H2 is supported in the contemporaneous model for eligible profitable firm-years at mean ESG. The FC standard deviation after firm and year effects is 0.2779, so one unit is approximately 3.60 such standard deviations. A one-standard-deviation change corresponds to a 0.3167-unit lower Q, or 17.22% of mean Q. Appendix E reports the sensitivity of this magnitude to firm omission.

TA $\times$ ESG is positive (1.9113), but imprecise ($p = 0.3249$). FC $\times$ ESG is also positive (1.4109), but not significant ($p = 0.2222$) and has the opposite sign to H4. Neither H3 nor H4 is supported. The 95% interaction intervals span both signs, so these tests do not establish absence of moderation or independence from ESG. The ESG coefficient is -2.5448 ($p = 0.1123$), providing insufficient evidence of a valuation association at mean TA and FC. Debt leverage is positive (coefficient 2.7939, $p = 0.0218$), but this does not establish a benefit of borrowing: debt is part of liabilities in Q. Growth is negative with $p = 0.0739$. Other controls are not significant at 5%; the logarithmic age coefficient is not given a structural interpretation because little age variation remains after the fixed effects.

Table 6. Hypothesis decisions and bootstrap inference

Hypothesis	Predicted sign	Clustered p	Wild p	Holm wild p	Decision
H1 TA	Negative	0.1227	0.0790	0.2370	Not supported
H2 FC	Negative	0.0045	0.0030	0.0120	Supported
H3 TA $\times$ ESG	Positive	0.3249	0.2511	0.4518	Not supported
H4 FC $\times$ ESG	Negative	0.2222	0.2259	0.4518	Not supported

Source: Calculations from the primary model. Wild p is a restricted wild cluster bootstrap-t p-value using 9,999 Rademacher draws. Holm adjustment is across the four hypothesis coefficients. Decisions require the predicted direction and a 5% threshold. All tests are two-sided. H2 support is conditional on mean ESG in the contemporaneous profitable-year sample.

FC remains significant under wild inference ($p = 0.0030$) and Holm adjustment ($p = 0.0120$). The unadjusted TA bootstrap p-value is 0.0790, below 10% but above the stated 5% threshold, and becomes 0.2370 after adjustment. Its positive sign also conflicts with H1. Neither interaction gains support from the bootstrap.

Measurement timing and inference sensitivity

Table 7 examines processing, panel balance, valuation definitions, the revenue input, tax fields, and lagged regressors. Six controls and both FE are retained. Alternatives use their eligible observations and applicable pooled cutoffs and centering means. When both sample and measure change, the comparison combines those changes. Sensitivity p-values are nominal; the primary model remains fixed.

Table 7 Sensitivity of the four hypothesis coefficients

Specification	N / Firms	TA	FC	TA $\times$ ESG	FC $\times$ ESG
Primary specification	256 / 66	0.6342 (0.1227)	-1.1394 (0.0045)	1.9113 (0.3249)	1.4109 (0.2222)
Without winsorization	256 / 66	0.2459 (0.3521)	-0.9498 (0.0162)	0.7000 (0.4514)	1.4100 (0.2613)
Five-year balanced panel	170 / 34	0.2296 (0.6743)	-1.3898 (0.0013)	5.0151 (0.1507)	1.0347 (0.1320)
Log Q	256 / 66	0.2972 (0.0969)	-0.5193 (0.0008)	0.9728 (0.1746)	0.4697 (0.0934)
Debt-based Q	256 / 66	0.5700 (0.1740)	-1.1363 (0.0059)	1.8070 (0.3585)	1.3984 (0.2272)

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Specification	N / Firms	TA	FC	TA × ESG	FC × ESG
Net sales in FC	240 / 64	0.5949 (0.1496)	−1.0955 (0.0045)	2.6916 (0.1907)	1.9477 (0.1341)
Standardized ETR fields	255 / 66	0.7189 (0.0310)	−1.1534 (0.0057)	1.9976 (0.0832)	1.5226 (0.1986)
One-year lagged regressors	211 / 52	−0.3821 (0.5887)	−0.2782 (0.3899)	0.6450 (0.8624)	0.8957 (0.2721)

Source: Calculations from LSEG (Refinitiv). Cells contain coefficients with firm-clustered p-values in parentheses. Debt-based Q substitutes interest-bearing debt for total liabilities. Net sales replaces total revenue in FC. Standardized ETR uses a matched tax-expense and pretax-income pair. The lag model uses consecutive prior-fiscal-year explanatory variables and controls. ESG availability and positive as-reported pretax income are checked at $t-1$; listing status, market-date validity, and positive Q are checked at outcome year t . Outcome years are 2019–2023, so FY2018 inputs can supply the first lag. Log Q is calculated from positive raw Q and then winsorized on the logarithmic scale. Sensitivity p-values are nominal.

FC is negative and nominally significant at 5% in the raw, balanced, log-Q, debt-based-Q, net-sales, and standardized-tax specifications in Table 7. With lagged regressors, the sample becomes 211 observations from 52 firms and $FC = -0.2782$ ($p = 0.3899$). The lag result provides insufficient evidence of a delayed association. Both the estimate and the sample change; reduced statistical power has not been established as the explanation. FC is negative under all ten outlier treatments and significant at the 5% level under eight. Its p-value is 0.087 when FC alone is left unwinsorized and 0.112 when Q is also unwinsorized, while the remaining ratios retain primary processing. Both sensitivities are concentrated in the BYAN 2021 observation. The firm's three observations account for 49.3% of the residual sum of squares of winsorized Q after firm and year effects are removed. Excluding BYAN with the primary cutoffs retained gives -1.20 ($p = 0.001$). BYAN remains in the primary sample. Appendix E reports all ten treatments and the observation diagnostics.

At the primary ESG reference, leave-one-firm-out estimates remain negative with $p < 0.03$ under retained and recomputed cutoffs. Adding inverse assets in IDR gives $FC = -1.0924$ ($p = 0.0064$). These checks complement the outlier evidence; shared-denominator concerns and sensitivity of the standardized magnitude remain. Appendix E separates component-model diagnostics from valid nested restrictions. The standardized tax-field specification gives a positive TA estimate of 0.7189 ($p = 0.0310$), contrary to H1. In the primary sample, 42 observations from 15 firms have standardized and as-reported ETRs differing by more than five percentage points. Final-tax presentation is a plausible contributor, alongside other differences in field scope and reclassification. The cause of each discrepancy has not been established from company tax notes, so these observations are not all classified as verified final-tax cases. The field comparison shows measurement sensitivity without establishing which estimate represents a causal tax-saving benefit.

Neither interaction is significant at 5% in the Table 7 models. Table B1 reports further exploratory diagnostics. Dropping AGE leaves FC at -1.1643 ($p = 0.0043$), with both interactions insignificant. Only about 0.30% of the pooled variance of logarithmic age remains after firm and year effects, which limits interpreting its coefficient. A heuristic exclusion based on repeated ETR gaps or real estate classification also leaves FC negative; the flag is a data diagnostic, not a confirmed classification of tax regimes. In an exploratory Bloomberg ETR diagnostic, TA is raw while other ratios are processed. $TA \times ESG$ has nominal $p = 0.0202$; omitting FREN 2023, whose ETR is approximately 228%, changes p to 0.6909. Classical standard errors also give a nominal $FC \times ESG$ $p = 0.0325$, compared with 0.2222 under firm clustering. Classical Holm adjustment raises p to 0.0974 and the positive coefficient is opposite to H4. Tables B1 and B2 disclose these diagnostics.

Comparison of ESG rating providers

Table 8 compares Refinitiv ESG Score and Bloomberg BESG ESG Score on 238 common observations from 64 firms. Financial variables are winsorized using the matched sample's own cutoffs, which are identical across the two models. Each ESG score is centered and divided by its provider-specific pooled standard deviation in that sample. This holds observations and financial processing constant across providers without treating their ratings as interchangeable or pooling them into one variable.

Table 8 ESG provider comparison on matched observations

ESG provider	N / Firms	TA	FC	TA × ESG	FC × ESG
Refinitiv ESG Score	238 / 64	0.6453 (0.1410)	−0.9549 (0.0250)	0.3165 (0.4508)	0.2604 (0.2708)
Bloomberg BESG ESG Score	238 / 64	0.4831 (0.2743)	−0.7509 (0.0481)	−0.0788 (0.8254)	0.1876 (0.1798)

Source: Calculations from LSEG (Refinitiv) and Bloomberg. Coefficients with firm-clustered p-values in parentheses. One ESG unit is one provider-specific pooled SD. Common financial cutoffs are recomputed on 238 observations. They are held constant across providers but differ from the primary 256-observation cutoffs. ESG interaction coefficients are therefore not directly on the Table 5 scale. No formal cross-provider coefficient-difference test is reported.

FC is negative under both matched sources: Refinitiv −0.9549 ($p = 0.0250$) and Bloomberg −0.7509 ($p = 0.0481$). Neither yields a significant TA association or ESG interaction. Point estimates and p-values alone do not establish a cross-provider coefficient difference. Keeping primary rather than matched-sample cutoffs gives Bloomberg FC approximately −0.816 ($p = 0.025$), illustrating sensitivity to the cutoff basis.

Sample coverage and Alternative Constraint Measures

Table 9 separates the integrated primary model from two companion models without TA and TA × ESG. The profitable-year companion coefficient is −0.9631 ($p = 0.0090$). Extending that specification to include loss years yields 295 observations from 76 firms and FC = −0.4573 ($p = 0.2110$; 95% CI [−1.1795, 0.2648]). The extension uses its own winsorization cutoffs and re-centering. The appropriate comparison is between the two companion models, rather than treating the expanded model as the integrated equation with extra rows.

Table 9. Financial constraints in comparable companion models

Specification	N / Firms	FC	Clustered p	95% confidence interval
Integrated primary profitable years	256 / 66	−1.1394	0.0045	[−1.9119, −0.3669]
Companion profitable years without tax block	256 / 66	−0.9631	0.0090	[−1.6773, −0.2488]
Companion including loss years without tax block	295 / 76	−0.4573	0.2110	[−1.1795, 0.2648]

Source: Calculations from LSEG (Refinitiv). Every model includes FC, ESG, FC × ESG, six controls, and firm and year effects. Only the integrated model includes TA and TA × ESG. ESG reference means are 0.4964 in the two profitable-year models and 0.4946 in the loss-inclusive model. Companion models use their own sample processing; the expanded sample adds six profitable observations and 33 loss observations.

Adding six additional profitable observations gives FC = −0.9918 ($p = 0.0070$). With loss years included, the confidence interval still contains the profitable-year companion estimate. A loss-interaction model gives FC × LOSS = −0.1627 (95% CI [−0.5381, 0.2126]; $p = 0.3905$). This supplies insufficient evidence of different profit-year and loss-year slopes. The interval is not an equivalence test. Table B3 reports the separate slopes. Alternative-index analyses examine the breadth of the FC interpretation. The size-age index of Hadlock and Pierce (2010) and an annual adaptation of the index of Whited and Wu (2006) were designed to proxy financing constraints through different operationalizations. They are related to, but not interchangeable with, accounting distress. Their two-way residual correlations with the primary FC measure are approximately −0.013 for SA and 0.005–0.017 for WW. Weak correspondence does not automatically invalidate the primary coefficient, but supplies no strong convergent support for a broad external-financing-constraints claim. The nominal SA result has clustered $p = 0.0044$ but wild-bootstrap p approximately 0.10 across three seeds. Excluding twelve size-capped firms and UNVR gives $p = 0.4046$ and wild $p = 0.3845$; nonlinear size controls absorb SA in that uncapped subset. WW has clustered p-values from 0.6131 to 0.9547 under six missing-value and industry-growth rules. The annual adaptation, size scaling, and dividend information limit clean construct validation. Appendix C documents these limitations.

Discussion of the findings

The principal finding is a negative contemporaneous valuation association with the specified distress-related FC proxy in profitable firm-years. Working capital, accumulated earnings, operating profitability, and revenue generation matter for continued operations, funding, and investment. Their deterioration can coincide with lower Q. The lagged, sample-extension, and processing results define the scope of this accounting-vulnerability association.

Excluding market equity avoids a component shared directly with Q. Appendix D shows the algebra and diagnostic comparisons for market-based Z variants. The contribution is transparent use and evaluation of the established modification in Indonesia. Assets remain a shared denominator, and operating fundamentals can influence valuation through channels beyond external finance. Fitriyana and Putra (2026) are the closest Indonesian comparison. Their reversed EMS orientation matches the higher-distress orientation here, so the negative main association is directionally consistent. Their positive ESG interaction is not established in this clustered model. The published article labels X3 “Revenue Ratio” and X4 “Market Value Ratio” without complete formulas (pp. 142–143); the Bloomberg score subtype and covariance implementation are also unspecified. Current-data variants are therefore comparative diagnostics. Market-equity variants resemble their reported dispersion more closely, but the actual inputs and source of the interaction difference remain unresolved.

For tax avoidance, the primary estimate is uncertain and field-sensitive. GAAP ETR reflects tax accounting and income composition as well as planning. The standardized-field comparison exposes material differences in the numerator-denominator basis, making the Indonesian final-tax context relevant to empirical comparability. It does not justify treating all low as-reported ETRs as aggressive avoidance or all field gaps as final-tax effects. The positive standardized-field estimate likewise cannot prove that avoidance creates shareholder value.

The agency and stakeholder explanations remain competing mechanisms. The main TA confidence interval permits both negative and positive associations, so the evidence does not support H1’s selected cost channel but also does not rule out tax-related valuation effects. The moderation question follows Elamer et al. (2024) and Indonesian sustainability-reporting research, with differences in the tax measure, outcome approximation, and reporting construct. An insignificant interaction does not prove that investors ignore ESG when assessing taxes, and a disclosure indicator is not the same variable as a vendor ESG rating.

FC × ESG is positive and uncertain. Buffering would correspond to a positive coefficient, while H4 predicts a negative interaction through resource pressure. The current interval spans both directions. Differences from international findings can involve measurement and sample design. Classical versus clustered standard errors are one possible contributor to differing reports. Berg, Kölbels, and Rigobon (2022) show that ESG ratings diverge through scope, measurement, and weighting. Standardizing ratings changes regression units while preserving provider-specific constructs. Both matched models leave moderation uncertain. Indonesian studies should identify the exact score and provider and, where feasible, compare them on common observations. For managers and investors, the results support examining working capital, accumulated earnings, operating profitability, and revenue capacity alongside ESG ratings. A high ESG rating alone is insufficient evidence of a valuation buffer against weak financial conditions. Tax-rate comparisons should distinguish statutory relief, income composition, and accounting presentation. These implications concern the information used in assessment; the regressions do not prescribe more debt, more aggressive tax strategies, or cuts to sustainability activities.

CONCLUSION

This study examines tax avoidance, distress-related financial constraints, and ESG moderation using 256 observations from 66 nonfinancial IDX companies during 2019–2023. In the integrated firm and year FE model, higher FC is associated with lower contemporaneous Tobin’s Q at mean ESG in profitable firm-years. H2 is supported within that scope and remains significant under restricted wild bootstrap and Holm correction. The primary tax hypothesis and both ESG moderation hypotheses are unsupported at 5%. The contribution is a matched as-reported ETR basis, a distress-related proxy excluding market equity, and an ESG-provider comparison on common observations. FC estimates remain negative across ten outlier treatments, with significance under eight; lagged and loss-inclusive companion estimates are not statistically significant. SA and WW provide limited convergent support for a broad external-financing label. The practical implication is to examine accounting vulnerability alongside ESG ratings and distinguish tax-field definitions when assessing valuation evidence.

Limitations and Future Research

The panel is selected by ESG availability, profitable-year eligibility, and complete inputs and is not representative of all IDX firms. Its five-year window limits within-firm information for interactions and lagged

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relationships. Historical extracts incorporate information available in 2026 and may include later revisions, so they cannot establish what investors knew at earlier dates. Firm and year effects remove persistent firm differences and common shocks but do not address every time-varying omitted factor, simultaneity, or reverse association. The accounting FC proxy is closer to distress than a direct observation of finance access. Farre-Mensa and Ljungqvist (2016) caution against interpreting common indices as universal measures of constraints. Shared asset denominators and operating fundamentals remain relevant here. Annual GAAP ETR does not identify discretionary planning or fully capture final-tax burdens outside the income-tax line. Company-note reconciliation of tax-field differences, a longer point-in-time panel, and direct financing information would improve interpretation. Loss-inclusive cash-tax measures such as the approach of Henry and Sansing (2018) offer a future extension rather than a justification for the present profitable-year restriction. The exploratory FY2019–2024 extension is disclosed in Table B4. It yields positive TA with wild $p = 0.0094$ and Holm $p = 0.0282$, contrary to H1. Its positive $TA \times ESG$ has wild $p = 0.0392$ but Holm $p = 0.0784$ and does not meet the four-hypothesis 5% threshold. This extension is not used to replace the established 2019–2023 window or promote a primary moderation finding. Future studies can examine longer horizons and credible exogenous changes in tax or financing conditions, and formally test cross-provider coefficient differences.

Data Availability Statement

The study uses historical data obtained from LSEG (Refinitiv) and Bloomberg. Raw vendor extracts are not publicly deposited; access and redistribution are subject to the applicable provider license agreements. Variable definitions, processing rules, and analysis code can be provided by the corresponding author upon reasonable request. Researchers can obtain the underlying data through authorized access to the respective services. Access to code does not confer a right to redistribute vendor data.

APPENDIX A SOURCE COLUMNS

Table A1 identifies column aliases in the supplied extracts. They are extract labels rather than universal vendor field codes. Accounting ratios use the original-currency workbook; market capitalization and balance-sheet IDR amounts are used for Q. The issuer code and fiscal year form the observation key. AGE uses the incorporation year from LSEG; growth requires a preceding fiscal year rather than merely the preceding nonmissing row.

Table A1 Source columns for the primary variables

Input or variable	Extract column	Use
Market capitalization	mk01_market_cap	Q numerator in IDR
Total assets	v01_total_assets	Q and SIZE in IDR; ratios in reporting currency
Total liabilities	v02_total_liabilities	Q numerator in IDR
Pretax income as reported	lr04b_pretax_income_as_reported	Primary ETR denominator
Income tax as reported	tx01b_income_tax_as_reported	Primary ETR numerator
Pretax income standardized	lr04_pretax_income_cont_ops	Alternative ETR denominator
Income tax standardized	tx01_income_tax_total	Alternative ETR numerator
Current assets and liabilities	v03_current_assets; v04_current_liabilities	Working capital and LIQ
Retained earnings	v10_retained_earnings_total	FC
EBIT	lr01_ebit	FC
Total business revenue	lr10_total_revenue	FC and GROWTH

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Input or variable	Extract column	Use
Consolidated net income	lr06_net_income_consolidated	ROA
Interest-bearing debt	v16_total_debt	LEV; includes leases
Refinitiv ESG Score	esg01_refinitiv_esg_score	Primary ESG; divided by 100
Bloomberg BESG ESG Score	bbg01_esg_score	Matched-provider ESG comparison
Incorporation date	incorporation_date_lseg	AGE

Source: The supplied LSEG and Bloomberg extracts and data dictionaries. IDR and original-currency amounts are matched by issuer and fiscal year. Net sales uses the separately supplied net-sales field in its sensitivity specification.

APPENDIX B INFERENCE AND ADDITIONAL SENSITIVITY RESULTS

Bootstrap reproduction

Primary observations are sorted by issuer code and fiscal year; clusters follow lexicographic issuer-code order. For each tested coefficient, the zero restriction is imposed by removing that regressor while retaining controls and fixed effects. Restricted residuals receive one Rademacher weight per firm and draw. The unrestricted equation is re-estimated and the studentized statistic uses the same CR1 finite-sample factor as the observed statistic. With $N = 256$, $G = 66$, and rank $K = 81$, that factor is $(G/(G - 1))((N - 1)/(N - K)) = 1.4795604$. NumPy default_rng with PCG64 uses seeds 20261002, 20261003, 20261004, and 20261005 for TA, FC, TA $\times$ ESG, and FC $\times$ ESG, respectively. Draws are generated in blocks of shape $G \times \min(500, \text{remaining draws})$, choosing from $[-1, +1]$, then transposed. Both the cluster order and block layout matter for exact numerical reproduction. With 9,999 draws, p equals the number of absolute bootstrap statistics at least as large as the absolute observed statistic, plus one, divided by 10,000. Holm-adjusted p-values use this four-coefficient family. These details document implementation rather than implying that a different random seed changes the substantive testing rule.

Table B1 Additional measurement and control diagnostics

Specification	N / Firms	TA	FC	TA $\times$ ESG	FC $\times$ ESG
Without AGE	256 / 66	0.6403 (0.1049)	-1.1643 (0.0043)	1.9410 (0.2925)	1.4845 (0.1979)
Without heuristic tax-gap or real estate flag	214 / 54	1.0502 (0.0592)	-1.3078 (0.0058)	1.3024 (0.5507)	1.9274 (0.1624)
Bloomberg ETR without TA winsorization	251 / 66	0.6752 (0.0117)	-1.1689 (0.0044)	2.0834 (0.0202)	1.4132 (0.2365)
Same ETR diagnostic excluding FREN 2023	250 / 66	0.8283 (0.1797)	-1.1753 (0.0047)	1.2617 (0.6909)	1.3898 (0.2397)

Source: Calculations from LSEG and Bloomberg. Coefficients with firm-clustered p-values. The exclusion flag covers twelve firms with repeated ETR gaps above five percentage points or real estate classification; it is not a verified final-tax classification. The Bloomberg ETR diagnostic changes the tax source and leaves TA uncapped, while other primary ratios retain winsorization. FREN 2023 is removed only as an influence diagnostic. All rows are exploratory.

Table B2 Covariance sensitivity for the hypothesis coefficients

Hypothesis term	Coefficient	Classical p	HC1 p	Clustered p
TA	0.6342	0.2688	0.0681	0.1227
FC	-1.1394	0.0039	0.0119	0.0045

Hypothesis term	Coefficient	Classical p	HC1 p	Clustered p
TA × ESG	1.9113	0.4576	0.2335	0.3249
FC × ESG	1.4109	0.0325	0.1105	0.2222

Source: The same primary FE design and coefficient estimates. Classical and HC1 tests use 175 residual degrees of freedom; CR1 tests use 65 cluster degrees of freedom. The positive FC × ESG coefficient is opposite to H4. Its nominal classical p = 0.0325 becomes 0.0974 under Holm adjustment across four hypothesis terms. Firm clustering is the primary covariance estimator.

Table B3 Loss status and financial constraint slopes in the companion model

Quantity	Coefficient	Clustered SE	p-value	95% confidence interval
Profitable-year FC slope	−0.4058	0.3806	0.2897	[−1.1640, 0.3523]
FC × LOSS slope difference	−0.1627	0.1884	0.3905	[−0.5381, 0.2126]
Loss-year FC slope	−0.5686	0.4442	0.2045	[−1.4534, 0.3163]

Source: Calculations from the 295-observation, 76-firm companion sample, including 33 loss years. TA and TA × ESG are excluded. The model adds LOSS and FC × LOSS to the companion equation, with the same controls and FE. Loss-year slope is the sum of the profitable-year slope and interaction. The difference interval crosses zero and does not establish either heterogeneity or equivalence.

Table B4 Exploratory FY2019–2024 extension

Hypothesis term	Coefficient	Clustered p	Wild p	Holm wild p
TA	1.1028	0.0136	0.0094	0.0282
FC	−1.3253	0.0051	0.0039	0.0156
TA × ESG	3.8414	0.0574	0.0392	0.0784
FC × ESG	0.5909	0.6079	0.6299	0.6299

Source: Calculations from LSEG (Refinitiv). N = 334; firms = 74. The integrated model includes firm and year FE and the six controls, with extension-specific winsorization and centering. Bootstrap seeds and block layout follow the corresponding primary hypotheses. Holm adjustment is across the four extension coefficients. The analysis is exploratory and does not replace FY2019–2023.

APPENDIX C ALTERNATIVE CONSTRAINT INDEX DIAGNOSTICS

SA uses the published size-age form, $-0.737 \times \text{size} + 0.043 \times \text{size}^2 - 0.040 \times \text{listing age}$, with assets converted to real 2004 USD millions, capped at USD 4,500 million, and listing age capped at 37 years. It uses listing age rather than the incorporation-age control. For regression, SA is scaled by its pooled standard deviation in the primary sample (0.4106). Its standard deviation after firm and year effects is only 0.02081. The coefficient per one within standard deviation is −0.2215, so a large coefficient per pooled standard deviation should not be confused with the identifying variation.

Table C1 Exploratory size–age index sensitivity

Specification	N / Firms	SA coefficient	Clustered p	Wild p
Standard controls	256 / 66	−4.3699	0.0044	0.0993
Exclude capped firms and UNVR	196 / 53	−4.8406	0.4046	0.3845
Uncapped subset with nonlinear size controls	196 / 53	Not identified	—	—
Full sample with nonlinear size controls	256 / 66	−5.3586	0.0002	0.2612
Nonlinear controls excluding UNVR	251 / 65	−13.1548	0.3995	0.3837

Source: Calculations from LSEG (Refinitiv). SA replaces FC and its ESG interaction in the integrated model. Coefficients are per primary-sample pooled SD. Nonlinear controls add SIZE² and SIZE-by-year interactions. Wild p uses 9,999 Rademacher draws with seed 20261006; the first-row p is 0.0990 and 0.1001 at seeds 20261007 and 20261008. The uncapped subset comprises 53 firms after excluding twelve size-capped firms and UNVR. Its nonlinear specification is rank-deficient, so no coefficient is reported.

The annual WW adaptation uses cash flow, dividend-payment status, long-term debt/assets, log assets, industry revenue growth, and firm revenue growth. Cash flow is continuing income plus depreciation, depletion, and amortization, divided by assets; missing depreciation is set to zero in this exploratory implementation. Size uses nominal IDR millions. Industry growth uses annual median revenue growth from the 865-firm nonfinancial (BICS Level 1) comparison universe, classified as of September 30, 2026, with industry-to-sector fallback. These choices differ from the original US quarterly calibration, so this is not an externally validated Indonesian WW implementation.

Seven issuers in K3 are classified as Financials under GICS despite their nonfinancial BICS classification: CASH, MCAS, MPIX, PLAS, SRTG, STAR, and TOSK. None is in the 66-firm primary panel. Current classification snapshots describe this comparison universe; historical classifications were not supplied. Dividend cash payments are missing in 41 primary observations. Prior-fiscal-year DPS matches observed current-year payment status in 194 of 195 comparable cases and supports inference in ten of the missing cases; 31 remain unknown. An inferred declaration-based status is not an observed cash payment. W2 retains that distinction and excludes unresolved statuses. Two missing long-term-debt inputs are reconstructed from other debt fields as zero or approximately zero, including three original-currency units for BYAN 2023. They are not both certified observed zeros.

Table C2 Exploratory annual WW index under six data rules

Rule	N / Firms	WW coefficient	Clustered p	FC–WW residual correlation
W0 missing dividend = no payment; missing LTD = 0	256 / 66	0.0194	0.9264	0.0067
W1 complete dividend and LTD inputs	209 / 53	0.1136	0.7039	0.0127
W2 prior-year DPS inference; unresolved excluded	221 / 55	0.1405	0.6131	0.0117
W2b unresolved dividend = no payment	256 / 66	0.0122	0.9547	0.0052
W2 industry growth requires at least 3 firms	221 / 55	0.0631	0.8186	0.0170
W0 industry growth requires at least 3 firms	256 / 66	−0.0297	0.8874	0.0117

Source: Calculations from LSEG and Bloomberg. WW replaces FC and its ESG interaction, with other primary regressor categories and both FE retained. WW is winsorized and scaled by its own eligible-sample pooled SD. W2 reconstructs missing LTD from other debt fields. Residual correlations remove both firm and year effects. Rules change eligibility and processing and are exploratory. No direct-FC hypothesis is declared supported from these models.

The nonsignificant WW results across data rules are not solely a consequence of treating all missing dividends as zero. Nevertheless, the adaptation and weak within-firm dividend information limit validation. The fragile SA result is also insufficient for convergent support. Related indices may capture different financing mechanisms, but that distinction does not shield a broad constraints label from scrutiny. The primary interpretation remains the specifically defined accounting-distress channel.

APPENDIX D MARKET VALUE OVERLAP AND COMPARATIVE DIAGNOSTICS

Let L denote total liabilities divided by total assets; L is not the interest-bearing debt leverage control. With Q defined in Equation (1), a market-equity ratio $X_4 = MVE/TL$ satisfies the following identity whenever liabilities are positive.

$$X_4^{market} = \frac{Q}{L} - 1 \quad (D1)$$

For an illustrative negative EMS variant with $Z_0 = 3.25 + 6.56(WC/A) + 3.26(RE/A) + 6.72(EBIT/A)$, the market-equity component enters the distress measure directly.

$$FD_{market} = -Z_0 + 1.05 - 1.05 \frac{Q}{L} \quad (D2)$$

Holding accounting components and L fixed, Q therefore enters FD mechanically. This identity does not quantify the fraction of an observed regression association attributable to the shared component, or imply that all economic relationships are spurious. It is a reason to disclose and check the component definition. Removing market equity does not eliminate the common asset denominator.

Table D1 compares four negative EMS variants in a diagnostic balanced panel of 175 observations from 35 current-data firms during 2020–2024. The diagnostic uses Bloomberg ESG Disclosure Score on its original 0–100 scale, negative ETR, log assets, firm FE only, and no winsorization. It does not recover the original comparison study's firms or unspecified Bloomberg score. The identities above hold numerically in all 175 balanced and 301 eligible unbalanced diagnostic observations, with residual errors below 10^{-13} .

Table D1 Negative EMS component diagnostics on a common balanced sample

Component variant	SD of FD	Minimum FD	FD classical t	FD–Q residual correlation
EBIT/assets and book equity/liabilities	4.0762	−20.6307	−1.1435	−0.1853
EBIT/assets and market equity/liabilities	9.6859	−69.1637	−6.2807	−0.7293
Revenue/assets and market equity/liabilities	10.7319	−71.8269	−6.1247	−0.7247
Revenue/assets and book equity/liabilities	5.3624	−26.1991	−0.9019	−0.1708

Source: Calculations from the current vendor data. $N = 175$; firms = 35. The EMS coefficient set is 3.25, 6.56, 3.26, 6.72, and 1.05, with reversed sign. The reported residual correlation removes both firm and year effects, whereas the diagnostic regression includes firm FE only. This is an operational-definition diagnostic, not an exact replication of Fitriyana and Putra.

The market-equity variant with EBIT has FD SD 9.6859 and minimum −69.1637, compared with the comparison paper's reported SD 9.2580 and minimum −79.8110. The book-equity variant gives SD 4.0762 and minimum −20.6307. Resemblance in those summaries is a clue about possible operational differences, not proof of the comparison study's actual component. No variant reproduces its reported interaction t statistic of 5.6642. These results justify precise component reporting and cautious comparison, without identifying the cause of the remaining difference.

APPENDIX E OUTLIER AND COMPONENT DIAGNOSTICS

The following analyses are exploratory sensitivities of the established primary specification. They retain the four hypothesis directions and report every examined outlier treatment. None changes the primary eligibility criteria or determines a replacement model.

E1 Alternative outlier processing

Table E1 Financial constraint estimates under ten outlier treatments

Treatment	N / Firms	FC	Clustered p
Primary: all seven ratios, 1st/99th percentiles	256 / 66	-1.1394	0.0045
No winsorization of the seven ratios	256 / 66	-0.9498	0.0162
FC raw; other six ratios at primary cutoffs	256 / 66	-0.8214	0.0871
Q raw; other six ratios at primary cutoffs	256 / 66	-1.1440	0.0064
FC and Q raw; other five ratios at primary cutoffs	256 / 66	-0.8213	0.1117
All seven ratios, 0.5th/99.5th percentiles	256 / 66	-1.2609	0.0028
All seven ratios, 2.5th/97.5th percentiles	256 / 66	-1.4480	0.0039
All seven ratios, 5th/95th percentiles	256 / 66	-1.0979	0.0014
Trim FC beyond primary 1st/99th cutoffs	250 / 65	-1.4959	0.0001
Trim FC and Q beyond primary 1st/99th cutoffs	243 / 64	-1.5281	0.0001

Source: Independently reproduced calculations from the supplied vendor data. All rows retain firm and year effects, ESG, both ESG interactions, and six controls. Trimming removes observations beyond the primary pooled cutoffs, then firms with fewer than two eligible years; remaining ratios are winsorized on the reduced sample. Other rows have N = 256 and 66 firms. Clustered p-values are two-sided and unadjusted. The ten rows include the primary treatment. Both exceptions retain the negative FC sign. Their wider uncertainty shows sensitivity to the processing of a composite accounting measure. Different treatment of different variables can be substantively motivated; the exceptions are retained in the evidence.

E2 BYAN and the FC tails

Table E2 Sensitivity to each FC tail observation

Observation	Raw FC	Clipped FC	Only this FC raw: β	p	All raw except this FC: β	p
BRMS 2022	0.8366	0.6854	-1.1556	0.0040	-0.8022	0.0979
BRMS 2023	0.8345	0.6854	-1.1176	0.0052	-0.8365	0.0776
BUMI 2021	1.2237	0.6854	-1.2687	0.0011	-0.7056	0.1535
BYAN 2021	-4.8682	-4.6502	-0.8041	0.1338	-1.1244	0.0041
ITMG 2022	-4.8715	-4.6502	-1.1052	0.0053	-0.8461	0.0855
LPPF 2019	-4.9473	-4.6502	-1.0320	0.0112	-0.9029	0.0712

Source: Independently reproduced influence diagnostics. Each column pair changes only the indicated FC input relative to the relevant complete-sample specification; other ratios retain primary cutoffs. TA, FC, and ESG are centered again. These are observation-level processing diagnostics, not deletion rules. With FC and Q raw and the other five ratios at primary cutoffs, clipping only FC for BYAN 2021 gives -1.1314 ($p = 0.0054$). With only FC raw, clipping that observation gives -1.1244 ($p = 0.0041$). Thus both preprocessing sensitivities concentrate in this observation. The difference between its raw FC and the cutoff is about 0.22.

Table E3 BYAN observations and market-value reconciliation

FY	Raw Q	Processed Q	Raw FC	Processed FC	MVE / (price × shares)	Market date
2021	2.8297	2.8297	−4.8682	−4.6502	1.000000	2021-12-30
2022	11.8929	11.8929	−4.4719	−4.4719	1.000000	2022-12-30
2023	12.9352	12.3619	−3.4903	−3.4903	1.000000	2023-12-29

Source: Derived ratios and date reconciliation from the supplied extracts. Primary FC cutoffs are −4.6502 and 0.6854; the primary upper Q cutoff is 12.3619. Market capitalization equals the unadjusted closing price multiplied by shares outstanding on the same market date in each of the three years, within numerical precision. BYAN is retained because it meets sample eligibility and this reconciliation reveals no market-value mismatch.

BYAN's three observations contribute 49.3% of the sum of squared Q residuals after firm and year effects are removed; with winsorized log Q the corresponding share is 16.4%. The 49.3% describes variation in the processed outcome before conditioning on economic regressors. It is not a contribution share for the estimated FC coefficient or a regression leverage statistic. The primary within-FC sum-of-squares share is 3.45%. With raw FC and winsorized log Q, $FC = -0.4683$ ($p = 0.0023$). Omitting BYAN with primary cutoffs retained gives -1.1968 ($p = 0.0010$); with raw FC and those other cutoffs it gives -1.1335 ($p = 0.0019$).

E3 Firm omission and the common denominator

Table E4 Leave-one-firm-out ranges at the primary mean ESG

Cutoff policy	FC coefficient range	Maximum clustered p	Effect as % of subset mean Q
Primary cutoffs retained	−1.3456 to −1.0122	0.0210	14.59 to 19.05
Cutoffs recomputed after omission	−1.9797 to −0.9990	0.0253	14.45 to 26.73

Source: Sixty-six firm omissions under each policy. Coefficients and p-values are evaluated at the full primary sample's mean ESG, 0.4964054. Effect magnitudes use each subset's two-way residual FC standard deviation and mean Q. Recomputing cutoffs changes remaining firms' values as well as sample composition. All 132 common-reference tests have $p < 0.03$.

The primary magnitude is 17.22% of mean Q per one two-way residual standard deviation of FC. With primary cutoffs retained, the omission ranges are 14.59%–19.05%; the largest standardized magnitude follows omitting MNCN. Recomputed cutoffs give 14.45%–26.73%, with the largest magnitude following omitting LPPF. These comparisons preserve the negative direction but show that the percentage magnitude depends on sample composition and processing.

Adding inverse assets in a common currency, 10^{12} / total assets in IDR, gives $FC = -1.0924$ ($p = 0.0064$). The inverse-assets coefficient is -2.0207 ($p = 0.4760$). This specification checks one form of size dependence; it does not remove every possible association generated by a shared asset denominator. Inverse assets in mixed reporting currencies are not used.

E4 Component models and coefficient restrictions

Table E5 Accounting component and auxiliary restriction diagnostics

Model or restriction	Quantity	Estimate / statistic	Clustered p
Working capital / assets	Coefficient	0.5537	0.7692
Retained earnings / assets	Coefficient	0.7392	0.8430
EBIT / assets	Coefficient	2.7542	0.2372
Revenue / assets	Coefficient	1.3684	0.0402
Separate components jointly zero	F(4,65)	1.7501	0.1498

Model or restriction	Quantity	Estimate / statistic	Clustered p
Separate-component coefficient proportionality	F(3,65)	0.1653	0.9194
FC excluding revenue	FCc	-1.9835	0.0122
Negative revenue / assets alone	FCc	-1.4875	0.0827
Nested raw-component proportionality	F(6,65)	0.4127	0.8680
Restricted auxiliary raw-FC model	FC	-0.8214	0.0871

Source: Reproduced exploratory component models and independent nested-restriction calculations. In the separate-component model, the four component ratios are winsorized independently, entered with TA, ESG and TA $\times$ ESG, controls and both FE, and FC $\times$ ESG is omitted. This changes both processing and specification relative to the primary model.

Before clipping, raw FC equals minus the weighted component sum to numerical precision. Separately winsorizing the composite and components creates a maximum discrepancy of 0.5998. The separate-component proportionality test is therefore not nested in the primary model and cannot validate its weights. Its high p-value also does not establish that the weights are optimal or measure credit access.

The nested auxiliary model keeps FC and its four components raw while other ratios retain primary cutoffs. The unrestricted version includes each centered component and each component $\times$ ESG interaction. Six proportionality restrictions yield $F(6,65) = 0.4127$ ($p = 0.8680$). The restricted auxiliary FC coefficient is -0.8214 ($p = 0.0871$), as already reported in the outlier grid. This auxiliary result is disclosed alongside the restriction test and is not substituted for the primary model.

The coefficient for FC excluding revenue is -1.9835 ($p = 0.0122$); negative revenue/assets alone gives -1.4875 ($p = 0.0827$). These different proxies provide a limited check on turnover dependence. The EBIT/assets component correlates 0.8808 with ROA after both sets of effects, so FC is interpreted conditional on net profitability. These analyses do not supply direct evidence of external financing restrictions.

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ESG MODERATION OF TAX AVOIDANCE AND DISTRESS-RELATED FINANCIAL CONSTRAINTS IN INDONESIAN FIRM VALUATION

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