

## When ESG Meets Foreign Capital: Market Valuation Evidence from Indonesia's LQ45

Adi Handika<sup>1)</sup>

Universitas Islam Negeri K.H. Abdurrahman Wahid, Indonesia <sup>1)</sup>

[adi.handika25004@mhs.uingusdur.ac.id](mailto:adi.handika25004@mhs.uingusdur.ac.id)<sup>1)</sup>

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### ABSTRACT

*The valuation relevance of Environmental, Social, and Governance (ESG) information remains debated in emerging capital markets. This study examines the relationship between ESG Risk Score and firm value and tests whether Net Foreign transactions moderate that relationship among LQ45 firms on the Indonesia Stock Exchange. The unbalanced panel contains 540 firm period observations from 73 constituents across twelve LQ45 observation windows from February to July 2020 through August 2025 to January 2026, while the primary regression uses 527 observations from 71 firms. The primary firm fixed effects model reports a positive ESG Risk Score coefficient and a positive ESG Risk Score  $\times$  Net Foreign interaction, although the direct ESG coefficient becomes insignificant after time effects are included and the lagged interaction is not significant. The findings indicate that ESG risk pricing is contemporaneous and conditional on foreign trading participation, market period, and sector environment rather than representing a universal valuation premium.*

### ABSTRAK

Relevansi informasi Environmental, Social, and Governance terhadap valuasi perusahaan masih diperdebatkan di pasar modal negara berkembang. Penelitian ini menguji hubungan antara ESG Risk Score dan nilai perusahaan serta menilai apakah transaksi Net Foreign memoderasi hubungan tersebut pada perusahaan LQ45 di Bursa Efek Indonesia. Panel tidak seimbang mencakup 540 observasi perusahaan periode dari 73 konstituen dalam dua belas jendela observasi LQ45, mulai Februari sampai Juli 2020 hingga Agustus 2025 sampai Januari 2026, sedangkan regresi utama menggunakan 527 observasi dari 71 perusahaan. Model firm fixed effects menunjukkan koefisien ESG Risk Score dan interaksi ESG Risk Score  $\times$  Net Foreign yang positif, tetapi koefisien langsung ESG menjadi tidak signifikan setelah efek waktu dimasukkan dan interaksi tertinggal tidak signifikan. Temuan menunjukkan bahwa penilaian risiko ESG bersifat kontemporer dan bergantung pada partisipasi perdagangan asing, periode pasar, dan lingkungan sektoral, bukan merupakan premi valuasi yang bersifat universal.

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## INTRODUCTION

Environmental, Social, and Governance information has become an important input in portfolio allocation (Global Sustainable Investment Alliance, 2022), yet its valuation relevance remains unsettled in emerging markets. ESG information can signal risk management quality, stakeholder resilience, and exposure to future regulatory costs, but investors do not necessarily interpret the same signal in the same manner. Recent evidence shows that the association between ESG measures and firm value varies across institutional settings, valuation proxies, and market conditions (Huang, 2022; Rahat & Nguyen, 2024). Much of this evidence, however, examines ESG disclosure or performance in isolation, without accounting for the investors who process and trade on that information. Foreign investors, in particular, may differ in information sets, sustainability mandates, and investment horizons, and their participation can contribute to price discovery in emerging markets (Cai et al., 2022; Lopez-de-Silanes et al., 2024). This variation indicates that ESG valuation should be examined as a conditional market process shaped by investor composition, rather than as an automatic premium.

Indonesia provides a relevant setting because its equity market combines concentrated ownership, uneven sustainability disclosure, and substantial foreign trading activity. The LQ45 index contains the most liquid and visible issuers on the Indonesia Stock Exchange and represents the segment where ESG information, analyst attention, and international capital are most likely to interact. The sample records an average PBV of 3.17, a standard deviation of 7.79, and a maximum of 136.00, showing considerable valuation dispersion among large and liquid firms. Net Foreign transactions also range from minus 18,482.90 to 22,190.90 million IDR across the twelve observation windows from February to July 2020 through August 2025 to January 2026 (Angir & Weli, 2024).

The novelty of this study lies in combining a risk based ESG measure with a transaction-based measure of foreign participation. The Sustainability ESG Risk Score measures residual unmanaged risk, whereas Net Foreign captures contemporaneous foreign buying and selling pressure rather than stable ownership. This design differs from prior ownership-based studies, which examine monitoring through equity stakes or board representation (Lopez-de-Silanes et al., 2024; Rahim et al., 2024), because it instead tests a market pricing channel based on active capital flows. The contribution is located in the interaction between signal content and investor composition, rather than in an assumption that ESG risk or foreign participation independently creates a valuation premium.

This study examines the relationship between ESG Risk Score and firm value, tests the direct association of Net Foreign with firm value, and evaluates whether Net Foreign moderates the ESG risk valuation relationship among LQ45 firms. The analysis contributes evidence from a Southeast Asian emerging market and clarifies the distinction between ESG risk exposure and positive ESG performance. It also evaluates whether the interaction remains visible after common time shocks, within firm dependence, lagged variables, and sector heterogeneity are considered. The study therefore develops a conditional interpretation of ESG risk pricing that connects disclosure content with the market participants incorporating it into valuation.

## LITERATURE REVIEW

### Signaling Theory and the ESG Valuation Mechanism

Signaling theory explains why sustainability information can affect valuation under information asymmetry (Spence, 1973). ESG disclosures and risk assessments can communicate management quality, operating discipline, and exposure to future costs, although

the signal is useful only when it is credible and comparable. The Sustainalytics ESG Risk Score differs from a positive performance score because it measures residual unmanaged risk after considering a firm's exposure and management response. A higher score should therefore communicate greater unresolved risk rather than superior sustainability quality (Huang, 2022).

The valuation effect of an ESG signal also depends on the capacity of investors to interpret it. Complex ESG information combines sector materiality, nonfinancial exposure, and forward-looking assessments that cannot be reduced to a single disclosure decision. Investors with different information sets and analytical routines may therefore assign different values to the same risk score. This receiver side of signaling provides a basis for examining investor composition without assuming that every investor responds uniformly

### **Stakeholder Theory and Sustainability Governance**

Stakeholder theory links ESG risk to relationships with employees, communities, regulators, customers, and capital providers (Liang & Renneboog, 2017). Unresolved environmental, social, or governance exposure can generate regulatory sanctions, operational disruption, reputational loss, and changes in expected cash flows (Zhang & Wong, 2022). These effects may not appear immediately in accounting numbers but can influence valuation through risk expectations and resilience (El Ghouli et al., 2011). Evidence from recent ESG research supports the relevance of stakeholder and valuation channels across different market settings (Broadstock et al., 2021; Zhou et al., 2022).

The Indonesian setting makes the stakeholder mechanism relevant because LQ45 firms receive considerable public, regulatory, analyst, and investor attention. Their ESG Risk Scores may inform assessments of risk control and preparedness for sustainability related capital allocation. The effect need not be identical across sectors because resource intensive and physical asset-based activities face different material exposures from financial or service activities. Sector heterogeneity is therefore examined in the additional analysis rather than assumed in the theoretical discussion.

### **Institutional Investor Preference Theory and the Role of Foreign Investors**

Institutional investors can incorporate ESG information into portfolio selection, but their preferences are not homogeneous (Aguilera et al., 2008). Recent evidence shows that institutional ownership and portfolio weights vary across ESG measures, while the valuation role of foreign institutions also depends on investment horizon and information conditions (Huang & Huang, 2025; Lopez-de-Silanes et al., 2024; Rahim et al., 2024). These findings support investor heterogeneity rather than a general claim that all foreign investors maintain the same ESG mandate. The present study therefore separates foreign participation from a universal monitoring assumption.

Net Foreign transactions measure the balance between foreign purchases and sales during an observation window. The measure can reflect information-based trading, liquidity demand, market timing, portfolio rebalancing, and global risk sentiment. It does not identify investor type, ownership percentage, engagement activity, or holding horizon. The variable is consequently interpreted as active foreign market participation rather than direct evidence of long-term governance intervention.

### **Information Asymmetry, Investor Heterogeneity, and Price Discovery**

Information asymmetry provides a direct explanation for why investor composition can change the valuation relevance of ESG risk. Investors may differ in access to research, experience with sustainability metrics, and the weight placed on nonfinancial risks. Foreign participation can contribute to price discovery when trades incorporate information that is

costly for other market participants to process (Cai et al., 2022). ESG Risk Score may therefore enter prices differently when foreign buying or selling pressure changes.

Market microstructure also implies that the direction of a transaction based moderation effect cannot be assumed to represent long term ESG preferences. Net buying can occur alongside sector opportunities, liquidity shocks, earnings expectations, or global portfolio allocation, while net selling can occur despite favourable firm specific information. A significant interaction indicates that the ESG slope varies with foreign trading participation, but it does not by itself identify the reason for the trades. This distinction provides the conceptual basis for a non directional moderation hypothesis and a cautious interpretation of the interaction coefficient.

### **Hypothesis Development**

Drawing on the theoretical foundations and literature reviewed above, this study advances three hypotheses.

**H1:** ESG Risk Score has a negative relationship with firm value.

Signaling theory and stakeholder theory imply that unmanaged environmental, social, and governance risk can weaken expected cash flows and increase regulatory, reputational, and stakeholder costs. A higher Sustainalytics ESG Risk Score indicates greater residual unmanaged risk, whereas a lower score indicates stronger risk management. Investors who incorporate the expected consequences of unresolved ESG exposure should apply a valuation discount to firms with higher scores. The study therefore predicts a negative relationship between ESG Risk Score and firm value (Huang, 2022; Rahat & Nguyen, 2024).

**H2:** Foreign investor participation has a positive effect on firm value.

Foreign buying can improve liquidity, contribute to price discovery, and communicate external demand for a firm's shares. A positive net transaction balance may therefore coincide with higher market valuation when foreign purchases exceed foreign sales. The prediction concerns a transaction based market association and not a long term monitoring mechanism. The direct coefficient is interpreted cautiously because Net Foreign may also reflect global sentiment and portfolio rebalancing.

**H3:** Foreign investor participation moderates the relationship between ESG Risk Score and firm value by strengthening the valuation relevance of ESG risk information.

Information asymmetry and investor heterogeneity imply that the valuation sensitivity to ESG risk can change with the investors active in the market (Chen & Xie, 2022). Foreign transactions can accelerate the incorporation of information into prices, but the balance between buying and selling does not provide a theoretically unambiguous directional prediction. The interaction term therefore tests whether the ESG Risk Score slope varies with Net Foreign rather than presuming that foreign activity always produces an ESG premium. A significant interaction supports conditional ESG risk pricing, while its sign must be interpreted together with the direction of the Sustainalytics scale and the simple slope estimates

## **METHOD**

### **Research Design and Data Sources**

This study employs an explanatory quantitative design with an unbalanced panel approach to examine the relationship between ESG Risk Score, Net Foreign transactions, and market valuation among LQ45 firms on the Indonesia Stock Exchange. Secondary data were obtained from annual financial statements, Sustainalytics, the Indonesia Stock Exchange, the Indonesian Central Securities Depository, and Bloomberg. Firm value is primarily measured

by LnPBV, while PBV and LnMarketCap are used as alternative proxies. The empirical interpretation is associative because the observational design does not establish exogenous variation in ESG risk or foreign trading.

The dataset contains twelve consecutive LQ45 constituent windows from February to July 2020 through August 2025 to January 2026. The final window closes in January 2026, so the study spans calendar years 2020 to 2026 but does not include a February to July 2026 observation window. The exact windows are used for observation window fixed effects and for constructing the one consecutive window lag. Annual fixed effects assign each observation window to the calendar year in which it closes, providing a transparent treatment of windows that cross two calendar years.

The use of LQ45 firms is not intended to represent the entire Indonesian equity market. This sample reflects the segment in which ESG information, analyst attention, trading liquidity, and foreign participation are most likely to meet. Smaller issuers may have weaker ESG disclosure coverage and lower foreign investor visibility, making the same model less suitable for them. The sample choice therefore follows the logic of theoretical relevance rather than broad population coverage.

The data structure also requires attention because LQ45 membership changes across periods. Firms may enter and leave the index depending on liquidity, market capitalisation, and exchange criteria. This rotation creates an unbalanced panel, but it also reflects the actual institutional design of the index. Fixed effect estimation is appropriate because it allows the model to control for time invariant firm characteristics while using available variation across observed firm periods.

## Population and Sample

The research population comprises firms included in the LQ45 index during twelve constituent windows from February to July 2020 through August 2025 to January 2026. Purposive sampling requires availability of ESG Risk Score, financial information, market data, and foreign transaction data for the relevant observed window. The base dataset contains 540 firm period observations from 73 firms across ten industry sectors, while the primary LnPBV model uses 527 observations from 71 firms. The LnMarketCap specification uses 525 observations from 71 firms because of model specific data availability. Changes in LQ45 membership across the twelve windows create an unbalanced panel that is estimated using firm fixed effects.

**Table 1. Operationalisation of Research Variables**

| Variable                     | Measurement                                                         | Role        | Unit         | Source               |
|------------------------------|---------------------------------------------------------------------|-------------|--------------|----------------------|
| Firm Value                   | LnPBV as the primary proxy; PBV and LnMarketCap as alternatives     | Dependent   | Ratio or log | IDX and Bloomberg    |
| ESG Risk Score               | Sustainalytics score; higher values indicate greater unmanaged risk | Independent | Score        | Sustainalytics       |
| Net Foreign                  | Foreign purchases minus foreign sales during the observation window | Independent | Million IDR  | IDX and KSEI         |
| ESG Risk Score × Net Foreign | Product of ESG Risk Score and Net Foreign                           | Moderating  | Product term | Calculated           |
| Profitability                | Return on Assets                                                    | Control     | Percent      | Financial statements |
| Free Float                   | Shares available for public trading                                 | Control     | Percent      | IDX and prospectus   |
| Firm Size                    | Natural logarithm of total assets                                   | Control     | Log          | Financial statements |

Source: (Author's elaboration, 2026).

Table 1 clarifies how each construct is converted into an empirical variable. Firm value is represented through three proxies: PBV as the raw valuation ratio, LnMarketCap as an

alternative market valuation proxy, and LnPBV as the primary dependent variable because it reduces the extreme skewness of raw PBV. ESG performance is deliberately operationalised as ESG risk exposure because Sustainalytics measures residual unmanaged risk rather than a positive ESG achievement score. This distinction is important because a higher ESG Risk Score indicates greater ESG risk, not better ESG performance. Net Foreign measures net buy and sell transactions by foreign investors, so it captures active foreign participation in market trading rather than stable ownership concentration. The interaction term is calculated by multiplying ESG Risk Score and Net Foreign to test whether foreign investor participation changes the valuation relevance of ESG risk information.

### Econometric Model

$$\begin{aligned} \text{FirmValue}_{it} = & \alpha_i + \beta_1 \text{ESGRisk}_{it} + \beta_2 \text{NetForeign}_{it} \\ & + \beta_3 (\text{ESGRisk}_{it} \times \text{NetForeign}_{it}) + \beta_4 \text{ROA}_{it} + \beta_5 \text{FreeFloat}_{it} \\ & + \beta_6 \text{LnAsset}_{it} + \varepsilon_{it} \end{aligned} \quad (1)$$

As shown in equation (1), FirmValue represents PBV, LnMarketCap, or LnPBV depending on the model specification. ESGRisk refers to the Sustainalytics ESG Risk Score, NetForeign represents foreign investor trading participation, and ESGRisk x NetForeign captures the moderating role of foreign investor participation in the ESG risk valuation relationship. The subscripts *i* and *t* denote firm and period respectively.  $\alpha_i$  represents firm fixed effects, capturing unobserved and time invariant factors specific to each firm. The interaction term is constructed to test whether foreign investor participation changes the valuation relevance of ESG risk information. Because interaction models require conditional interpretation, the ESG x Foreign coefficient is not interpreted as a standalone direct effect, but as evidence that the relationship between ESG Risk Score and firm value varies with the level of foreign investor participation (Brambor et al., 2006). This specification is consistent with the study objective because the main contribution lies in the conditional role of foreign investor participation in ESG valuation.

### Justification of Estimation Technique

The fixed effects model is selected based on the Hausman test, which rejects the null hypothesis of random effects consistency at the 5 percent significance level. This result indicates that unobserved firm-specific effects are correlated with the explanatory variables, making fixed effects estimation more appropriate for obtaining consistent estimates. The model therefore focuses on within-firm changes over time while controlling for time-invariant characteristics, such as founding ownership structure, business identity, and long-standing industry affiliation.

Firm-clustered robust standard errors are employed to address heteroskedasticity and potential within-firm error correlation, which commonly arise in financial panel data with substantial cross-firm variation. The dependent variable is transformed into its natural logarithm because raw PBV has a severely right-skewed distribution, with a skewness value of 12.74. Continuous regression variables are also winsorized at the 1st and 99th percentiles to limit the influence of extreme observations without removing them from the dataset. These procedures reduce the effect of skewness and outliers and improve the reliability of statistical inference, although they do not eliminate potential endogeneity.

This study does not report classical assumption tests such as normality, multicollinearity, or Breusch-Pagan heteroskedasticity tests in the conventional cross-sectional OLS sense. These diagnostics are primarily designed for small-sample, single cross-section regressions and become less informative once firm-clustered robust standard errors are applied, because clustering already accounts for heteroskedasticity and within-firm serial correlation directly at the covariance-matrix level rather than through residual-based pre-tests (Petersen, 2009).

Furthermore, with a fixed effects panel structure and a moderately large number of firm-period observations, the asymptotic properties of the estimator rely on large-N consistency rather than the strict distributional assumptions required for small-sample inference (Wooldridge, 2010).

The results are interpreted as conditional associations rather than definitive causal relationships. Reverse causality may remain because firms with higher market valuations may attract more foreign investors, while firms with stronger market reputations may receive greater ESG analyst coverage. Fixed effects also cannot control for omitted variables that change over time, simultaneity, or other sources of endogeneity.

To strengthen the analysis, the additional specifications include annual fixed effects, observation-window fixed effects, and lagged explanatory variables. Annual fixed effects control for common market and macroeconomic shocks, while the lagged specification helps examine whether changes in the explanatory variables precede changes in firm value. This panel-specific strategy is consistent with recent guidance concerning unbalanced panel data, common time effects, and robust inference (Baltagi, 2021; Han & Kim, 2023).

## RESULTS AND DISCUSSIONS

### Descriptive Statistics

**Table 2. Descriptive Statistics**

| Variable               | N   | Mean   | Std. Dev. | Min        | Max       | Skewness |
|------------------------|-----|--------|-----------|------------|-----------|----------|
| LnPBV                  | 527 | 0.5719 | 0.8863    | -1.0498    | 4.9127    | 1.43     |
| PBV                    | 540 | 3.17   | 7.79      | 0.35       | 136.00    | 12.74    |
| ESG Risk Score         | 540 | 30.72  | 9.69      | 7.11       | 62.02     | 0.38     |
| Net Foreign (mil. IDR) | 540 | 19.71  | 2,082.13  | -18,482.90 | 22,190.90 | 0.27     |
| ROA (%)                | 540 | 5.74   | 10.27     | -167.33    | 35.82     | -6.81    |
| Free Float (%)         | 540 | 36.31  | 12.22     | 7.04       | 79.14     | 0.47     |
| LnAsset                | 540 | 31.87  | 1.54      | 28.21      | 35.12     | 0.11     |

Source: (Processed secondary data, 2026).

Table 2 presents the raw descriptive statistics before the winsorization procedure reported for the original regression analysis. The distributions of PBV, ROA, and Net Foreign show substantial variation and several extreme observations, supporting the use of logarithmic transformation, robust inference, and the stated outlier treatment. The difference between the number of observations in Table 2 and the regression models reflects model specific data availability and the requirement that PBV be positive for the LnPBV transformation. The descriptive values are rounded for presentation, while estimation uses the underlying analysis values.

The descriptive statistics reveal several important characteristics of the sample. The distribution of LnPBV (mean = 0.5719; std. dev. = 0.8863) exhibits substantial variation in market valuation among LQ45 issuers, reflecting fundamental heterogeneity that cannot be fully explained by observable financial variables. The distribution of ESG Risk Score (mean = 30.72; std. dev. = 9.69) indicates adequate variation in ESG risk exposure. Based on Sustainalytics classification, 14 observations (2.59%) fall into the Negligible Risk category, 69 observations (12.78%) into Low Risk, 219 observations (40.56%) into Medium Risk, 145 observations (26.85%) into High Risk, and 93 observations (17.22%) into Severe Risk. This composition shows that the majority of LQ45 observations remain at medium to high ESG risk levels, consistent with the uneven development of sustainability risk management in an emerging market. The extreme volatility of Net Foreign (std. dev. = 2,082.13; range =

40,673.80 million IDR) reflects the highly active and macroeconomically sensitive dynamics of foreign capital flows during the 2020 to 2026 period. Although this volatility descriptively indicates instability, it also provides empirical variation for testing whether foreign investor participation moderates the valuation relevance of ESG risk information.

Table 2 gives the first indication that the sample contains substantial financial heterogeneity despite being limited to LQ45 firms. The high skewness of raw PBV confirms that market valuation is concentrated in a small number of firms with exceptional valuation ratios. The logarithmic transformation reduces this imbalance and makes the dependent variable more suitable for panel regression. This transformation is not only a technical adjustment, but also a necessary step to prevent a few observations from dominating the interpretation of firm value.

The ESG Risk Score distribution shows that the average LQ45 firm remains in a moderate risk position. The presence of low, high, and severe risk observations indicates that ESG exposure differs meaningfully even among the most liquid Indonesian issuers. This variation is analytically useful because a narrow ESG distribution would make it difficult to identify valuation sensitivity. The pattern also supports the argument that ESG development in Indonesia remains uneven across firms and sectors.

Net Foreign transactions in Table 2 reveal a wide range between foreign buying and selling pressure. Such volatility reflects the role of foreign investors as active participants in Indonesian equity trading. It also warns against interpreting the variable as a pure proxy for long term ownership preference. The variable is better understood as a market participation measure that can transmit foreign investor attention into price formation.

## Panel Regression Results

**Table 3. Panel Fixed Effect Regression Results with Robust Standard Errors**

| Variable             | Statistic   | Model 1 (PBV) | Model 2 (LnMarketCap) | Model 3 (LnPBV) Primary |
|----------------------|-------------|---------------|-----------------------|-------------------------|
| Constant             | Coefficient | 14.0344       | 28.4969***            | 5.2465***               |
|                      | Robust SE   | 9.2332        | 1.2697                | 1.5047                  |
| ESG Risk Score       | Coefficient | 0.0333***     | -0.0056               | 0.0102**                |
|                      | Robust SE   | 0.0119        | 0.0042                | 0.0042                  |
| Net Foreign          | Coefficient | -0.00003064   | -0.00002351           | -0.00004717***          |
|                      | Robust SE   | 0.00005976    | 0.00002132            | 0.00001738              |
| ESG x Foreign        | Coefficient | 0.00000222    | 0.00000154*           | 0.00000266***           |
|                      | Robust SE   | 0.00000313    | 0.00000090            | 0.00000078              |
| ROA                  | Coefficient | 0.0208        | 0.0081                | 0.0086**                |
|                      | Robust SE   | 0.0188        | 0.0056                | 0.0035                  |
| Free Float           | Coefficient | 0.0920        | -0.0096*              | 0.0151***               |
|                      | Robust SE   | 0.0778        | 0.0055                | 0.0055                  |
| Firm Size (LnAsset)  | Coefficient | -0.9477*      | 0.1467**              | -0.3166***              |
|                      | Robust SE   | 0.5006        | 0.0731                | 0.0880                  |
| Observations         |             | 527           | 525                   | 527                     |
| Firms                |             | 71            | 71                    | 71                      |
| R-squared            |             | 0.5060        | 0.8376                | 0.8538                  |
| Adjusted R-squared   |             | 0.4226        | 0.8101                | 0.8291                  |
| Firm fixed effects   |             | Yes           | Yes                   | Yes                     |
| Period fixed effects |             | No            | No                    | No                      |

\*, \*\*, and \*\*\* indicate significance at the 10 percent, 5 percent, and 1 percent levels.

Source: (Processed secondary data, 2026).

Table 3 reports the fixed effect regression results with robust standard errors. The coefficient row shows the estimated effect of each variable, while the robust SE row reports the corresponding robust standard error used for statistical inference. All specifications include

firm fixed effects to control for unobserved time invariant firm characteristics, while period fixed effects are not included in the main specifications. The PBV and LnPBV models use 527 firm-period observations from 71 firms, while the LnMarketCap model uses 525 firm-period observations from 71 firms. Net Foreign and ESG x Foreign are displayed with additional decimal places because foreign investor participation is measured in monetary transaction units, making the coefficient values appear numerically small when rounded.

The comparison across models should not be read as a search for a preferred result, but as a way to assess whether the core relationship survives different valuation measurements. Raw PBV is useful as a baseline because it reflects the original market ratio, yet it is vulnerable to outlier influence. LnMarketCap captures market size more directly, but it is partly connected to firm size by construction. LnPBV provides the most suitable dependent variable for the research question because it measures relative valuation while reducing extreme skewness.

**Model 1 (PBV).** Results from Model 1, which uses raw PBV as the dependent variable, indicate that ESG Risk Score exerts a positive and significant effect on market valuation ( $p < 0.01$ ). Within the Sustainalytics measurement framework, where higher scores reflect greater unmanaged ESG risk, this positive coefficient suggests that, in this specification, firms with a higher ESG risk profile marginally maintain higher PBV. It must be emphasised that Model 1 is not the primary specification of this study; these results should be read in light of the limitations of raw PBV, which is highly susceptible to extreme values (maximum PBV = 136.00; skewness = 12.74), rendering estimates insufficiently reliable for causal inference. Methodologically, the fixed effect estimation controls for all time invariant firm characteristics, making a sector composition explanation unnecessary in this framework. Model 1 therefore serves as a comparative specification that underscores the importance of logarithmic transformation of the dependent variable. The interaction term ESG  $\times$  Foreign is not significant in this specification, indicating that the moderating effect of foreign investors cannot be reliably identified when using the outlier sensitive raw PBV proxy.

**Model 2 (LnMarketCap).** Using the logarithm of market capitalisation as an alternative valuation proxy, the interaction term is marginally significant ( $p < 0.10$ ), confirming that logarithmic transformation begins to reveal the conditional effect of foreign investors. The positive and significant size coefficient ( $p < 0.05$ ) in Model 2 is consistent with the expectation that market capitalisation correlates positively with asset size, affirming the construct validity of this alternative dependent variable.

**Model 3 (LnPBV), Primary Specification.** Model 3, employing LnPBV as the primary dependent variable, provides the main evidence for the research question because it uses a relative valuation proxy while reducing the outlier sensitivity of raw PBV. ESG Risk Score exhibits a positive and significant coefficient ( $\beta = 0.0102$ ;  $p < 0.05$ ). Within the Sustainalytics measurement framework, where higher scores reflect greater residual ESG risk, this positive coefficient indicates that ESG risk information is relevant to market valuation, although the direction does not follow the conventional expectation that lower ESG risk should always be associated with higher firm value. This result is consistent with the broader literature showing that ESG valuation effects may vary across institutional settings, sectors, and market conditions rather than appearing as a universal valuation premium (Friede et al., 2015; Aydoğmuş et al., 2022; Singh & Kumar, 2025). More importantly, the interaction term ESG x Foreign is positive and highly significant ( $\beta = 0.00000266$ ;  $p < 0.01$ ), suggesting that foreign investor participation strengthens the valuation relevance of ESG risk information. This finding is consistent with institutional investor preference theory because foreign investors may have stronger incentives and analytical routines for incorporating ESG related information into portfolio decisions (Bai et al., 2022; Dyck et al., 2019; Lopez-de-Silanes et al., 2024; Yu & Xiao, 2022).

The primary LnPBV model reports a positive and significant ESG Risk Score coefficient. This coefficient shows that ESG risk information is associated with valuation in the baseline

specification, but its positive sign is opposite to the negative relationship predicted by H1. H1 is therefore not supported because statistical significance does not compensate for a coefficient that contradicts the hypothesised direction. The result should not be interpreted as evidence that greater unmanaged ESG risk creates firm value.

The Net Foreign coefficient is negative and significant in the primary model, so H2 is not supported in its predicted positive form. Net Foreign measures the balance between foreign purchases and sales and can reflect portfolio rebalancing, liquidity demand, market timing, and global risk sentiment. The coefficient does not establish that foreign investors reduce firm value in a causal sense. It indicates that transaction based foreign participation does not independently produce the positive valuation association expected in H2.

The ESG Risk Score  $\times$  Net Foreign coefficient is positive and significant, which supports H3 as a moderation hypothesis. The interaction indicates that the slope of ESG Risk Score changes with the level of foreign trading participation. It does not show that foreign investors reward stronger ESG management because a higher ESG Risk Score represents greater unmanaged risk. The substantive direction is examined through simple slopes and the marginal effects graph in the robustness section.

The numerical size of the Net Foreign and interaction coefficients reflects the monetary unit of the transaction variable. A one unit change represents one million IDR, which is small relative to the observed range of foreign flows. Coefficients should therefore be interpreted using realistic changes in Net Foreign rather than through rounded values alone. The economic magnitude analysis reports the ESG slope at low, mean, and high levels of the moderator.

The control variables remain economically interpretable in the primary model. ROA and Free Float are positively associated with LnPBV, while Firm Size has a negative coefficient. The negative size coefficient is consistent with a relative valuation measure in which large asset bases may coincide with more moderate growth expectations. These results show that profitability, public trading availability, and asset structure enter valuation alongside ESG risk and foreign participation.

The additional analyses qualify the baseline interpretation rather than replacing it. The direct ESG Risk Score coefficient becomes insignificant after annual or observation window effects are included, while the contemporaneous interaction remains significant. The lagged interaction is not significant, and the subgroup results show that the ESG coefficient and interaction differ across sector environments. The primary finding is therefore a contemporaneous conditional association that is stronger than the evidence for a stable direct ESG effect.

The theoretical contribution concerns the conditions under which ESG risk enters market valuation. Signaling theory explains the relevance of the risk information, while information asymmetry and market microstructure explain why the slope can vary with active investor composition. The transaction based moderator supports a price formation interpretation rather than a long term governance claim. ESG risk is therefore priced differently across market periods, foreign trading conditions, and sector settings.

These findings extend prior evidence in two ways. Fatemi et al. (2018) show that disclosure quality moderates the valuation relevance of ESG information, a pattern conceptually consistent with the conditional framing advanced here, where active foreign trading participation functions as the compositional moderator instead of disclosure quality. Broadstock et al. (2021) and Zhou et al. (2022) similarly find that ESG valuation effects strengthen under specific market conditions rather than operating uniformly across firms. This study extends these findings by identifying active foreign trading participation, rather than firm-level disclosure quality or crisis conditions, as the specific market mechanism that conditions ESG risk pricing in the Indonesian LQ45 segment. A channel that remains underexplored in Southeast Asian emerging market research.

## Robustness Checks

To assess the reliability of the primary findings, two robustness checks were conducted. First, LnMarketCap was employed as an alternative valuation proxy (Robustness I) to examine whether the interaction findings depend on the choice of dependent variable. Second, the 93 observations from Sustainalytics' Severe Risk category were excluded (Robustness II) to evaluate whether the primary results are driven by extreme ESG outliers. Table 4 presents the comparative results across all three specifications.

**Table 4. Model Specification Comparisons**

| Variable              | Primary Model (LnPBV) | Robustness I (LnMarketCap) | Robustness II (LnPBV excl. Severe) |
|-----------------------|-----------------------|----------------------------|------------------------------------|
| Constant              | 5.2465***             | 28.4969***                 | 5.1047***                          |
| ESG Risk Score        | 0.0102**              | -0.0056                    | 0.0094**                           |
| Net Foreign           | -0.00004717***        | -0.00002351                | -0.0000**                          |
| ESG x Foreign         | 0.00000266***         | 0.00000154*                | 0.0000**                           |
| ROA                   | 0.0086**              | 0.0081                     | 0.0079**                           |
| Free Float            | 0.0151***             | -0.0096*                   | 0.0138***                          |
| Firm Size (LnAsset)   | -0.3166***            | 0.1467**                   | -0.2941***                         |
| Observations          | 527                   | 525                        | 434                                |
| Estimation            | Fixed Effect          | Fixed Effect               | Fixed Effect                       |
| Robust Standard Error | Yes                   | Yes                        | Yes                                |

Source: (Processed secondary data, 2026).

The robustness checks provide additional support for the primary finding. In Robustness I (LnMarketCap), the ESG x Foreign interaction term remains significant at  $p < 0.10$ , indicating that the moderation pattern is not limited to the LnPBV specification. In Robustness II, after excluding Severe Risk observations, the ESG Risk Score coefficient ( $\beta = 0.0094$ ;  $p < 0.05$ ) and the interaction term ( $p < 0.05$ ) remain significant, suggesting that the primary finding is not driven solely by firms with the highest ESG risk category. These checks should be interpreted as sensitivity tests rather than definitive causal validation. They reduce concerns that the results depend only on dependent variable choice or extreme ESG risk observations, but they do not fully eliminate possible simultaneity, omitted time varying shocks, or sector period dynamics. The robustness evidence therefore supports the stability of the association while keeping the causal interpretation intentionally cautious.

Table 4 extends the analysis by comparing the primary model with alternative specifications. The LnMarketCap model tests whether the moderation effect remains visible when firm value is measured through market capitalisation. The exclusion of Severe Risk observations tests whether the results are driven by the highest ESG risk category. The persistence of the interaction effect across these specifications strengthens the claim that foreign investor participation plays a conditional role in ESG valuation.

The robustness evidence should still be interpreted with methodological caution. Alternative dependent variables and ESG category exclusions improve confidence, but they do not fully remove simultaneity or omitted time varying shocks. Market valuation can be influenced by macroeconomic sentiment, sector rotation, and global capital movement during the same period. The robustness checks are useful because they reduce concerns about measurement dependence, not because they fully establish causality.

The exclusion of Severe Risk observations is particularly important for this study. If the main finding disappeared after removing the highest ESG risk firms, the result could be dismissed as an outlier effect. The continued significance of ESG Risk Score and the interaction term suggests that the pattern is not limited to extreme risk cases. This strengthens the view

that foreign investor participation moderates ESG pricing across a wider part of the LQ45 risk distribution.

The existing alternative valuation proxy and Severe Risk exclusion remain reported in Table 4 as the original robustness checks. The supplementary analysis extends those checks by adding annual fixed effects, observation window fixed effects, firm clustered standard errors, a one consecutive window lag specification, sector subgroup regressions, simple slopes, and a marginal effects graph. These additional results use the same effective estimation sample and variable construction that exactly reproduce the primary Table 3 coefficients. The exact observation windows run from February to July 2020 through August 2025 to January 2026.

**Table 5. Additional Panel Robustness Tests**

| Variable                         | Primary Firm FE                | Firm and Closing Year FE       | Firm and Observation Window FE with Firm Clustered SE | Lagged Model with Firm and Observation Window FE |
|----------------------------------|--------------------------------|--------------------------------|-------------------------------------------------------|--------------------------------------------------|
| ESG Risk Score                   | 0.0102**<br>(0.0042)           | 0.0028<br>(0.0039)             | 0.0018<br>(0.0071)                                    | 0.0045<br>(0.0079)                               |
| Net Foreign                      | -0.00004717***<br>(0.00001738) | -0.00005671***<br>(0.00001865) | -0.00005049**<br>(0.00002223)                         | -0.00002003<br>(0.00002777)                      |
| ESG × Foreign                    | 0.00000266***<br>(0.00000078)  | 0.00000271***<br>(0.00000079)  | 0.00000236**<br>(0.00000099)                          | 0.00000067<br>(0.00000117)                       |
| ROA                              | 0.0086**<br>(0.0035)           | 0.0079***<br>(0.0026)          | 0.0086**<br>(0.0042)                                  | 0.0033<br>(0.0035)                               |
| Free Float                       | 0.0151***<br>(0.0055)          | 0.0045<br>(0.0068)             | 0.0036<br>(0.0088)                                    | 0.0030<br>(0.0102)                               |
| Firm Size                        | -0.3166***<br>(0.0880)         | -0.1906**<br>(0.0753)          | -0.1909*<br>(0.1135)                                  | -0.1537<br>(0.1476)                              |
| Observations                     | 527                            | 527                            | 527                                                   | 445                                              |
| Firms                            | 71                             | 71                             | 71                                                    | 69                                               |
| Firm fixed effects               | Yes                            | Yes                            | Yes                                                   | Yes                                              |
| Closing year fixed effects       | No                             | Yes                            | No                                                    | No                                               |
| Observation window fixed effects | No                             | No                             | Yes                                                   | Yes                                              |
| Firm clustered SE                | No                             | No                             | Yes                                                   | Yes                                              |

Source: (Processed secondary data, 2026).

Table 5 evaluates whether the primary results remain visible after common time shocks and within firm dependence are considered. The interaction remains positive and significant in the closing year fixed effect model and in the observation window model with firm clustered standard errors. The direct ESG Risk Score coefficient becomes small and statistically insignificant in both time effect specifications. The closing year indicators are jointly significant ( $F = 5.3698$ ;  $p = 0.000023$ ), showing that common market conditions affected valuation during the observation period.

The lagged specification produces a weaker pattern. When explanatory variables are taken from the immediately preceding observed window, ESG Risk Score, Net Foreign, and their interaction are not statistically significant. This result does not overturn the contemporaneous model, but it limits an interpretation based on a persistent subsequent valuation effect. Reverse causality and simultaneous foreign capital allocation therefore remain relevant limitations.

For the exploratory subgroup analysis, environmentally sensitive sectors comprise Energy, Basic Materials, Industrials, and Infrastructures. These sectors have relatively direct exposure to resource use, emissions, physical assets, and operational externalities. The

remaining sectors form the comparison group. Each subgroup model includes firm fixed effects, observation window fixed effects, the original control variables, and standard errors clustered by firm.

**Table 6. Exploratory Sector Subgroup Analysis**

| Variable                         | Environmentally Sensitive Sectors | Other Sectors               |
|----------------------------------|-----------------------------------|-----------------------------|
| ESG Risk Score                   | 0.0054<br>(0.0077)                | -0.0246**<br>(0.0118)       |
| Net Foreign                      | -0.00015109*<br>(0.00008307)      | 0.00001523<br>(0.00002986)  |
| ESG × Foreign                    | 0.00000575**<br>(0.00000293)      | -0.00000065<br>(0.00000163) |
| Observations                     | 275                               | 252                         |
| Firms                            | 35                                | 36                          |
| Firm fixed effects               | Yes                               | Yes                         |
| Observation window fixed effects | Yes                               | Yes                         |
| Firm clustered SE                | Yes                               | Yes                         |

Source: (Processed secondary data, 2026).

The subgroup analysis provides a more cautious interpretation of the positive coefficient in the baseline model. In environmentally sensitive sectors, the ESG Risk Score coefficient is positive but statistically insignificant, whereas the interaction remains positive and significant. In the remaining sectors, the ESG Risk Score coefficient is negative and significant, which is consistent with the theoretical risk discount predicted by H1. The aggregate positive coefficient should therefore not be attributed to a general valuation benefit from unmanaged ESG risk.

The results indicate that ESG pricing differs across sector environments. Foreign trading participation conditions the ESG risk association mainly in sectors with greater environmental and operational exposure, while the direct risk discount is more visible in the comparison sectors. This pattern does not show that unmanaged risk creates value in sensitive sectors because the direct coefficient in that group is not statistically distinguishable from zero. The subgroup evidence supports heterogeneity and replaces the earlier speculative sector explanation.

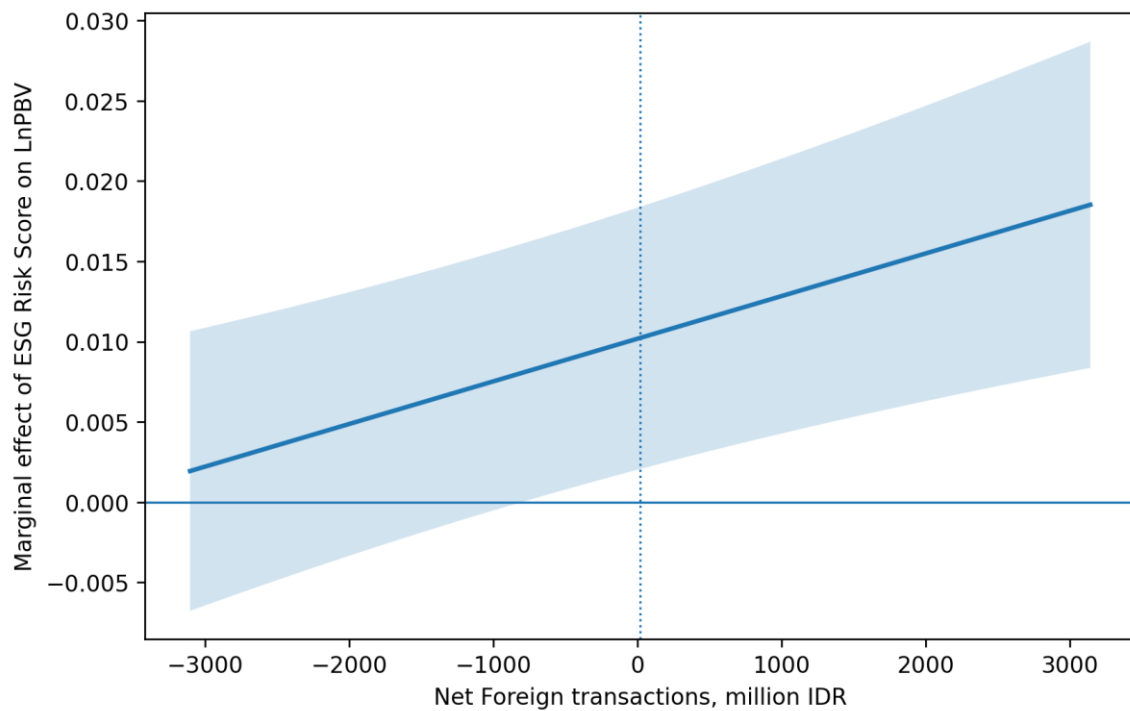
**Table 7. Simple Slopes and Economic Magnitude**

| Foreign Participation | Net Foreign Level | ESG Slope | Robust SE | p Value | PBV Change for One SD Increase |
|-----------------------|-------------------|-----------|-----------|---------|--------------------------------|
| Low                   | -2,062.42         | 0.00470   | 0.00420   | 0.262   | 4.66%                          |
| Mean                  | 19.71             | 0.01023   | 0.00417   | 0.014   | 10.42%                         |
| High                  | 2,101.84          | 0.01576   | 0.00473   | 0.001   | 16.50%                         |

Source: (Processed secondary data, 2026).

The economic magnitude of ESG Risk Score depends on Net Foreign because the primary model contains an interaction. At the mean level of Net Foreign, a one standard deviation increase in ESG Risk Score is associated with an estimated 10.42 percent increase in PBV. The corresponding associations are approximately 4.66 percent at a low level of Net Foreign and 16.50 percent at a high level. The low level slope is not statistically significant, while the mean and high level slopes are statistically significant. These values describe conditional model associations and do not imply that greater unmanaged ESG risk causes higher firm value.

**Figure 1. Marginal Effect of ESG Risk Score across Net Foreign Transactions**



Source: (Author's calculation, 2026).

Figure 1 presents the marginal effect of ESG Risk Score on LnPBV across the central range of Net Foreign transactions. The estimated slope is smaller and statistically uncertain when foreign selling pressure is relatively high. The slope becomes positive and statistically distinguishable from zero around the mean and at higher levels of net foreign buying. The figure confirms that the ESG Risk Score coefficient cannot be interpreted independently from foreign trading participation.

The positive interaction establishes a conditional market association, but its substantive meaning requires caution. A higher ESG Risk Score represents greater unmanaged risk, so the result does not show that foreign investors reward stronger ESG management. Stronger net foreign buying may coincide with sector opportunities, liquidity, earnings expectations, and other information incorporated within the same observation window. The expanded robustness analysis supports contemporaneous conditional pricing but does not establish a causal or persistent monitoring effect.

### Limitations and Future Research

The Sustainability ESG Risk Score measures residual unmanaged risk rather than absolute ESG achievement (Drempetic et al., 2020). A higher score indicates greater unresolved exposure and must not be interpreted as better ESG performance. This scale direction affects the assessment of H1 and the positive baseline coefficient. Future research can compare risk based measures with positive performance ratings and individual ESG pillars.

The sample covers twelve LQ45 constituent windows from February to July 2020 through August 2025 to January 2026. The final observation window closes in January 2026, and the dataset does not include the February to July 2026 constituent period. The use of changing index membership creates an unbalanced panel that reflects the institutional design of LQ45. The results therefore describe the liquid large capitalisation segment rather than all firms listed on the Indonesia Stock Exchange.

Net Foreign captures transaction flows and not stable foreign ownership. The measure may reflect information based trading, liquidity demand, portfolio rebalancing, market timing, and global risk sentiment. It does not identify investor type, holding period, engagement activity, or monitoring intensity. Custodial ownership and investor classification data are required to distinguish trading, preference, and governance channels.

The additional fixed effect and lagged specifications reduce selected concerns but do not establish causality. Annual and observation window effects absorb common shocks, while the lagged model provides limited evidence about temporal ordering. Time varying omitted firm characteristics and simultaneous changes in valuation and foreign trading can remain. Stronger identification would require exogenous policy variation, valid instruments, or another design that isolates changes in ESG risk or foreign participation.

The sector subgroup analysis is exploratory and depends on a broad classification of environmentally sensitive activities. The results show meaningful differences between the two groups, but they do not identify the specific environmental, social, or governance mechanism generating those differences. Larger samples could estimate separate sectors, sector by time effects, and alternative materiality classifications. The present evidence supports heterogeneous ESG risk pricing while leaving the source of that heterogeneity for further investigation.

## **CONCLUSION AND SUGGESTIONS**

### **Conclusion**

This study examines whether Net Foreign conditions the relationship between ESG Risk Score and firm value among LQ45 firms across twelve constituent windows from February to July 2020 through August 2025 to January 2026. The primary firm fixed effects model reports a positive ESG Risk Score coefficient, which is opposite to the negative direction predicted by H1. H1 is therefore not supported, and the direct ESG coefficient becomes insignificant after annual or observation window effects are controlled for. The evidence does not indicate that greater unmanaged ESG risk creates firm value. H2 is not supported because Net Foreign does not exhibit the predicted positive direct association with valuation. H3 is supported in the contemporaneous specifications because the ESG Risk Score  $\times$  Net Foreign interaction remains significant after time effects and firm clustered inference are introduced. The interaction is not significant in the lagged model, which limits claims concerning persistence, causality, and long term monitoring. Net Foreign is consequently interpreted as active trading participation rather than stable institutional ownership.

The main contribution is evidence that ESG risk pricing in the Indonesian large capitalisation segment depends on investor composition, observation window, and sector environment. The moderation result is concentrated in environmentally sensitive sectors, while the direct ESG coefficient is negative in the comparison sectors. These findings show that ESG information is not priced uniformly across firms or market conditions. Future research requires ownership based investor data and stronger identification strategies to determine whether foreign capital produces durable governance and valuation effects.

### **Suggestions**

Based on the findings, firms listed on the Indonesia Stock Exchange are encouraged to improve the quality, consistency, and credibility of ESG reporting in accordance with international standards such as GRI and TCFD in order to attract foreign investors and strengthen market valuation. Regulators should also enhance mandatory ESG disclosure frameworks and facilitate foreign institutional investor participation to accelerate the development of a sustainable capital market ecosystem in Indonesia. Future research is

recommended to employ alternative ESG proxies, expand the sample beyond LQ45 issuers, utilise ownership based foreign investor measures, and examine sectoral heterogeneity to obtain a more comprehensive understanding of the ESG firm value relationship in emerging markets.

For listed firms, the results imply that ESG reporting must move beyond symbolic disclosure. Investors with stronger sustainability orientation will not only observe whether a firm publishes ESG information, but also whether the information reduces uncertainty about risk exposure. Consistent and comparable reporting helps foreign investors evaluate ESG risk across firms and sectors. Fatemi et al. (2018) support this logic by showing that disclosure quality affects the valuation relevance of ESG information.

For regulators, the evidence highlights the importance of building an information environment that allows ESG risk to be priced more transparently. The Sustainable Finance Roadmap issued by OJK (Otoritas Jasa Keuangan, 2021) provides an institutional foundation, but disclosure rules need to be supported by comparable metrics and credible verification. Without reliable information, ESG signals may remain difficult for many investors to interpret. Stronger disclosure infrastructure can reduce the gap between sustainability commitment and market valuation.

For investors, the findings show that ESG risk should be read together with liquidity, profitability, sector exposure, and ownership structure. A high ESG Risk Score does not automatically mean that the market will apply a valuation discount in every context. Investors may still value firms with higher residual ESG risk when financial prospects, commodity exposure, or market liquidity remain attractive. This complexity explains why ESG based investment analysis in emerging markets requires contextual interpretation rather than mechanical screening.

For future empirical work, the most urgent improvement concerns the separation between foreign trading activity and foreign ownership. Net foreign transactions are useful for observing market participation, but they cannot fully capture institutional monitoring or shareholder engagement. Ownership based data would allow researchers to distinguish investors who trade actively from those who influence corporate policy over a longer horizon. Bai et al. (2022) and Dyck et al. (2019) indicate that institutional investor effects may operate through preference, monitoring, and capital allocation channels.

The practical implication is that ESG valuation in Indonesia depends on the joint development of corporate disclosure, investor sophistication, and market infrastructure. Firms need credible ESG reporting, regulators need comparable standards, and investors need analytical capacity to process sustainability risk. When these elements are weak, ESG information may remain visible but not fully priced. When they develop together, ESG risk can become a clearer component of capital market valuation.

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