

THE DELAYED EFFECT OOF ESG RISK SCORE ON IDX ESG LEADERS STOCK PRICES

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Article History	ABSTRACT
Received:	Purpose: This study examines whether ESG Risk Score has a delayed relationship with stock prices of IDX ESG Leaders companies.
Revised:	Method: The secondary panel contains 22 companies from 2020–2024. After creating a one-year lag, the effective sample consists of 88 observations. The model uses log closing price, firm size, firm and year fixed effects, and firm-clustered standard errors.
Accepted:	Finding: The previous year's ESG Risk Score has a negative coefficient ($\beta = -0.0237$), but it is not significant ($p = 0.250$; 95% CI = -0.0641 to 0.0167). Contemporaneous, return, and bootstrap tests provide the same conclusion. Lower ESG risk is directionally related to higher valuation, but the evidence is insufficient in this short panel.
Available online:	Novelty: The study changes the design from a same-year ESG–price relationship to $ESG(t-1) \rightarrow price(t)$, allowing a direct test of delayed ESG information processing in the Indonesian market. This design provides clearer temporal ordering. for interpreting the findings
Keywords: ESG Risk Score; Lagged Effect; Stock Price; Panel Data; IDX ESG Leaders;	

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INTRODUCTION

Environmental, social, and governance (ESG) information has become increasingly important in investment analysis. Investors no longer examine only profit, cash flow, and debt. They also consider how a company manages environmental exposure, employee relations, community impacts, and corporate governance. These factors may affect future operating costs, reputation, access to finance, and the ability to remain competitive. An ESG Risk Score summarizes the level of unmanaged ESG risk faced by a company. A higher score indicates greater risk, while a lower score indicates better risk management.

The influence of ESG information on stock prices may not occur immediately. Financial information is generally standardized and released on a clear reporting schedule. ESG information is more complex because it often combines quantitative indicators, narrative disclosures, and external ratings. Investors need time to compare the score with industry conditions, examine its reliability, and decide whether the information changes expected cash flows or risk. This process creates the possibility of delayed pricing, in which an ESG score published in one year is associated with the stock price in the following year.

Previous studies show that ESG can affect several aspects of capital markets. Leite and Uysal (2023) report that ESG scores are related to stock-price responses to new information. Chen and Wu (2025) discuss the relationship between ESG performance and stock-pricing efficiency. Other studies connect ESG with stock-price crash risk and volatility (Wang et al., 2023; Xu et al., 2025). These findings suggest that ESG is not merely a matter of corporate image. It can influence how investors assess risk and process company information.

However, recent reviews show that ESG findings are not always consistent. Cardillo and Basso (2025) conclude that governance structures, culture, economic conditions, industry characteristics, and research design can moderate the ESG–financial performance relationship. Di Tommaso and Mazzuca (2023) also show that the role of ESG factors may depend on company and market characteristics. Differences in rating providers, sectors, periods, and dependent variables can therefore produce different conclusions.

Research on Indonesian companies is still important because the Indonesian capital market has different levels of ESG awareness, information availability, and investor composition from developed markets. The IDX ESG Leaders index provides a relevant setting because it contains listed companies selected using ESG and financial considerations. Nevertheless, studying only companies in this index may also reduce variation because the sample already consists of firms with relatively strong ESG characteristics. This makes a careful research design necessary.

The earlier analysis connected ESG Risk Score and stock price in the same year. A contemporaneous model cannot clearly show whether ESG information appears before the observed price or only moves at the same time. It may also overlook the time required by investors to interpret nonfinancial information. This limitation creates a research gap that can be addressed by using the previous year's ESG Risk Score.

This study examines whether ESG Risk Score has a delayed relationship with the stock prices of IDX ESG Leaders companies. It contributes in three ways. First, it establishes the sequence $ESG(t-1) \rightarrow \text{stock price}(t)$. Second, it uses firm and year fixed effects to control for stable firm characteristics and common yearly shocks. Third, it compares the main model with contemporaneous ESG, stock-return, and lagged-change specifications. The study does not claim a causal effect, but it provides a clearer temporal test than a same-year regression.

THEORETICAL FRAMEWORK AND HYPOTHESIS DEVELOPMENT

Signaling theory explains how company information can reduce uncertainty between managers and investors. Companies with lower ESG risk may signal that they manage environmental, social, and governance problems more effectively. Better risk management can reduce the probability of regulatory penalties, operational disruption, and reputational damage. Because a higher ESG Risk Score represents greater unmanaged risk, the expected coefficient is negative: a higher score in the previous year should be associated with a lower stock price in the current year.

Stakeholder theory provides a second explanation. Companies depend on employees, customers, suppliers, communities, regulators, and investors. Effective stakeholder management can support customer loyalty, employee productivity, access to resources, and business continuity. These benefits may not appear immediately in accounting profit. Investors may wait for evidence that ESG policies are implemented consistently. Therefore, the value of stakeholder management may be reflected in stock prices with a delay.

Information asymmetry also supports the delayed-pricing argument. ESG information is multidimensional and is often more difficult to interpret than earnings or cash flow. Investors must determine which issues are financially material and whether the score accurately represents company risk. Recent systematic evidence highlights that differences in ESG measurement, data providers, national settings, and firm characteristics contribute to inconsistent findings (Martiny et al., 2024; Cardillo & Basso, 2025). A broad ESG score may therefore require additional analysis before investors use it in valuation.

Differences among ESG rating providers can slow this process. Berg et al. (2022) document substantial divergence in ESG ratings because providers use different scopes, measurements, and weights, while Christensen et al. (2022) show why corporate ESG performance can be evaluated differently across raters. Gibson Brandon et al. (2021) relate ESG rating disagreement to stock

returns, and Avramov et al. (2022) show that rating uncertainty affects sustainable investment decisions. When investors receive different signals, they may delay transactions or rely on other information before changing their portfolios.

Asset-pricing research further explains why ESG can influence market value. Pástor et al. (2021) show that green preferences and climate risk can affect equilibrium asset prices. Pedersen et al. (2021) describe the trade-off between ESG characteristics and portfolio efficiency. Bolton and Kacperczyk (2021) find that investors care about carbon risk, while Krueger et al. (2020) show that institutional investors consider climate risk important. Portfolio reviews and institutional approval processes, however, may cause adjustment to occur gradually.

Market conditions may also change the value of ESG. Broadstock et al. (2021) find that ESG performance supported resilience during the COVID-19 market crisis, while Flammer (2021) shows that environmental commitments can create financial consequences through green financing. These findings suggest that ESG benefits may become more visible when firms face a major test or when sustainability commitments affect financing and investor assessment.

A one-year lag is used because annual data are available consistently for all sample companies. This lag should not be interpreted as proof that investors require exactly twelve months. Gillan et al. (2021) emphasize that ESG and corporate finance are connected through several channels and may involve endogeneity, while Leite and Uysal (2023) show that ESG scores can shape stock-price responses to new information. The lag is therefore a practical method for establishing time order, while the exact response period remains a limitation.

Based on signaling theory, stakeholder theory, and the information-processing argument, firms with higher ESG risk are expected to receive a lower market valuation in the following period. The hypothesis is stated as follows: H1—The previous year's ESG Risk Score has a negative effect on the current year's stock price of companies included in IDX ESG Leaders.

RESEARCH METHODOLOGY

This study uses a quantitative approach and secondary panel data reconstructed from the appendix of Septiana Ika Lestari's undergraduate thesis. The unit of analysis is a firm-year observation. The initial dataset contains 22 IDX ESG Leaders companies observed from 2020 to 2024, producing 110 observations. Each firm has five observations. No duplicate firm-year records or missing values were found in the firm code, year, ESG Risk Score, closing price, and firm-size variables.

Stock price is measured as the natural logarithm of the annual closing price to reduce large differences in nominal share prices. The main independent variable is the previous year's ESG Risk Score. A higher score indicates greater unmanaged ESG risk. Firm size is included as a control variable. Creating the one-year lag removes the first observation for every company, leaving 88 observations from 22 firms for outcome years 2021–2024.

The main model is estimated using ordinary least squares with firm and year dummy variables, which is equivalent to a two-way fixed-effects model in this dataset. Standard errors are clustered at the firm level to allow residuals within the same company to be correlated and heteroskedastic. The model is: $\ln(\text{Price}_{it}) = \beta_1 \text{ESGRisk}_{i,t-1} + \beta_2 \text{Size}_{it} + \alpha_i + \lambda_t + \varepsilon_{it}$, where α_i represents firm fixed effects and λ_t represents year fixed effects.

Three robustness specifications are used. First, current-year ESG Risk Score replaces the lagged score. Second, annual log return replaces log stock price. Third, the previous change in ESG Risk Score is used to explain current return. Model checks include the variance inflation factor (VIF), Breusch–Pagan test, Jarque–Bera test, Durbin–Watson statistic, and a 2,000-replication cluster-pairs bootstrap. Coefficients, clustered standard errors, p-values, confidence intervals, and adjusted R^2 are reported. The results show associations and should not be interpreted as causal effects.

RESULTS AND DISCUSSION

The initial dataset forms a balanced panel of 110 observations from 22 companies over five years. ESG Risk Score ranges from 10.96 to 28.18, while closing stock price ranges from IDR 167 to IDR 7,350. After creating the lag, the effective sample has a mean lagged ESG Risk Score of 21.29 and a mean log stock price of 6.940. The mean annual log return is -0.084 , indicating an overall downward tendency in the effective sample, although the variation across companies is substantial.

Table 1
Descriptive Statistics of the Lagged Sample

Variable	N	Mean	Std. deviation
Log closing price	88	6.940	0.852
Lagged ESG Risk Score	88	21.292	4.771
Firm size	88	16.502	2.452
Annual log return	88	-0.084	0.386

Source: Processed appendix data.

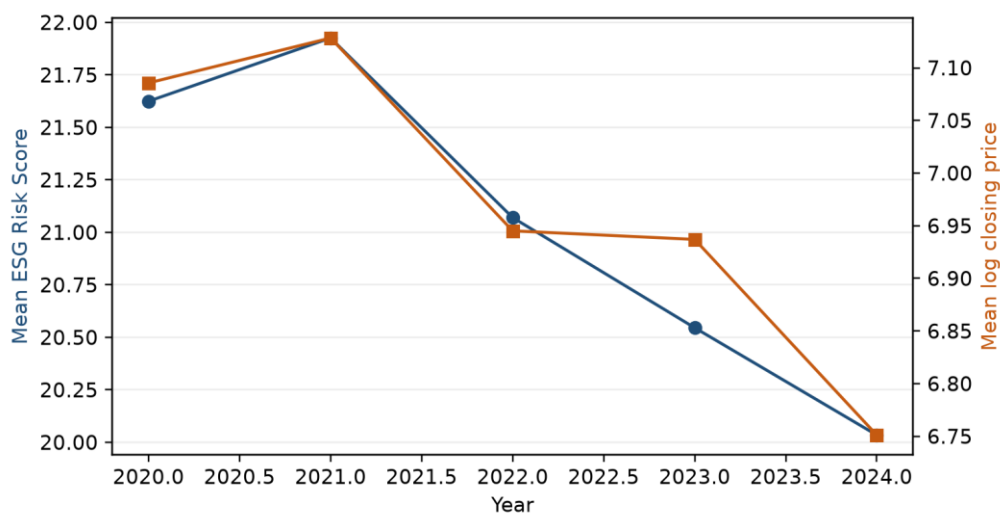


Figure 1. Annual Mean ESG Risk Score and Log Closing Stock Price, 2020–2024

Figure 1 shows that the annual averages of ESG Risk Score and log stock price do not move in exactly the same pattern in every year. This aggregate figure is descriptive and may be influenced by yearly market conditions. The main interpretation therefore relies on within-firm changes after controlling for firm and year fixed effects, rather than on the simple annual trend.

Table 2
Fixed-Effects Regression and Robustness Tests

Specification	ESG coefficient	Clustered SE	p-value	N	Adjusted R ²
Lagged ESG → log price	-0.0237	0.0206	0.250	88	0.880
Current ESG → log price	-0.0164	0.0206	0.425	88	0.879
Lagged ESG → log return	-0.0068	0.0164	0.680	88	-0.109

Specification	ESG coefficient	Clustered SE	p-value	N	Adjusted R ²
Lagged Δ ESG $\rightarrow$ log return	-0.0247	0.0285	0.386	66	-0.070

Source: Author's calculations. All models include firm and year fixed effects; standard errors are clustered by firm.

The main fixed-effects model produces a lagged ESG Risk Score coefficient of -0.0237 with a firm-clustered standard error of 0.0206 . The negative direction is consistent with H1. For a small coefficient, a one-point increase in the previous year's ESG risk is associated with an approximately 2.37% lower current stock price. However, the relationship is not statistically significant ($p = 0.250$), and the 95% confidence interval includes zero (-0.0641 to 0.0167). H1 is therefore not supported.

The contemporaneous model produces a coefficient of -0.0164 ($p = 0.425$), which is also negative and not significant. When annual log return is used as the outcome, the lagged ESG coefficient is -0.0068 ($p = 0.680$). The lagged change in ESG Risk Score produces a coefficient of -0.0247 ($p = 0.386$). All specifications have the same negative direction, but none provides sufficient statistical evidence of a consistent delayed relationship.

Additional diagnostic tests were examined because the main model uses a short panel. The VIF values for lagged ESG Risk Score and firm size are both 1.05, indicating no serious multicollinearity between the main explanatory variables. The Breusch–Pagan test is significant ($p = 0.008$), showing heteroskedasticity. The Jarque–Bera test is also significant ($p < 0.001$), indicating nonnormal residuals. The Durbin–Watson statistic is 2.10 and does not indicate an obvious first-order residual pattern. Because heteroskedasticity is present, clustered standard errors are more appropriate than conventional OLS standard errors.

A 2,000-replication cluster-pairs bootstrap was also conducted to address the limited number of firms. The bootstrap mean coefficient is -0.0223 , with a 95% percentile interval from -0.0606 to 0.0190 and a two-sided sign-based p-value of 0.231. This result is close to the main clustered estimate and confirms that the conclusion is not caused only by the conventional asymptotic test. The direction remains negative, but the uncertainty is too large to reject a zero relationship.

Table 3
Model Diagnostics and Additional Robustness Check

Test	Statistic	Interpretation
VIF: lagged ESG / size	1.05 / 1.05	No serious multicollinearity
Breusch–Pagan	$p = 0.008$	Heteroskedasticity detected
Jarque–Bera	$p < 0.001$	Residuals are nonnormal
Durbin–Watson	2.10	No obvious first-order pattern
Cluster-pairs bootstrap	95% CI [-0.0606, 0.0190]	Lagged ESG remains nonsignificant

Several factors may explain the insignificant result. The effective period includes only four outcome years and 22 firm clusters, which limits statistical power. Investor attention to ESG may also differ across sectors even though all firms are included in the same index. ESG scores tend to change slowly, while stock prices respond quickly to earnings, interest rates, macroeconomic conditions, and market sentiment. In addition, IDX ESG Leaders already selects firms using ESG-related criteria, which may reduce variation in ESG risk.

The firm-size variable requires particular caution. Values in the appendix range from 8.95 to 19.52 and appear to use scales that may not be fully consistent across firms. Firm fixed effects absorb stable differences in levels, but changes in an inconsistently measured control can still affect

estimation. The original financial statements should therefore be checked and firm size should be recalculated using one currency unit and one logarithmic formula before journal submission.

Compared with international evidence, the result suggests that the market relevance of ESG may be contextual rather than universal. Cardillo and Basso (2025) show that the ESG–financial performance relationship depends on several moderating conditions, including industry, governance, culture, and methodological choices. Di Tommaso and Mazzuca (2023) likewise find that the role of ESG factors can depend on company characteristics. The negative coefficient in this study is consistent with the direction of the risk score, but the coefficient sign alone is not sufficient evidence of an ESG price premium.

Rating disagreement provides another explanation. A score from one provider may differ from another provider because of differences in methodology (Berg et al., 2022). Investors using several sources may not react uniformly to one score. Avramov et al. (2022) show that rating uncertainty can weaken sustainable investment decisions, while Gibson Brandon et al. (2021) connect disagreement with returns. This dataset uses only one ESG Risk Score and cannot identify whether weak market response results from conflicting ESG signals.

Annual closing price may also be less sensitive than a shorter event window. The market may react days or months after an ESG rating is released, and the response may disappear before year-end. Leite and Uysal (2023) emphasize stock-price responses to new information. Chen and Wu (2025), Wang et al. (2023), and Xu et al. (2025) also examine pricing efficiency, crash risk, and volatility. Future research could therefore use announcement dates, abnormal returns, volatility, downside risk, or liquidity as alternative outcomes.

The practical implication is that a nonsignificant coefficient should not be interpreted as evidence that ESG has no value. Flammer (2021) and Bolton and Kacperczyk (2021) show that environmental commitments and carbon risk can matter through financing and asset-pricing channels. In IDX ESG Leaders, ESG may function more as an indicator of resilience or tail risk than as a direct driver of annual price levels. Investors should combine ESG Risk Score with financial fundamentals, while companies should improve the consistency and timing of ESG information.

CONCLUSION AND RECOMMENDATIONS

This study tests the proposed novelty of a delayed ESG Risk Score relationship with stock prices. Using 88 firm-year observations, the previous year's ESG Risk Score has a negative coefficient of -0.0237 , but the relationship is not statistically significant ($p = 0.250$). The contemporaneous model, stock-return models, diagnostic tests, and cluster bootstrap lead to the same conclusion. ESG risk is directionally associated with lower prices, but the evidence is insufficient to confirm a consistent delayed effect. Future studies should extend the period, verify firm-size measurement, include market return and financial controls, and use the actual ESG publication date. Investors should not use ESG Risk Score as a single trading signal but should combine it with financial and market information.

DECLARATION OF ARTIFICIAL INTELLIGENCE USAGE

During the preparation of this manuscript, the author(s) used artificial intelligence solely to check the consistency between in-text citations and the reference list, improve grammar and sentence clarity, and assist in formulating more specific and clearly stated research gaps and research novelty. Artificial intelligence was not used to generate research data, conduct statistical analysis, interpret the findings, or determine the conclusions. The author(s) reviewed and revised all AI-assisted outputs and remain fully responsible for the accuracy, originality, integrity, and final content of the manuscript

CONFLICT OF INTEREST

The author(s) declare that there are no conflicts of interest regarding the research, authorship, or publication of this article.

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REFERENCES

- Avramov, D., Cheng, S., Lioui, A., & Tarelli, A. (2022). Sustainable investing with ESG rating uncertainty. *Journal of Financial Economics*, 145(2), 642–664. <https://doi.org/10.1016/j.jfineco.2021.09.009>
- Berg, F., Kölbel, J. F., & Rigobon, R. (2022). Aggregate confusion: The divergence of ESG ratings. *Review of Finance*, 26(6), 1315–1344. <https://doi.org/10.1093/rof/rfac033>
- Bolton, P., & Kacperczyk, M. (2021). Do investors care about carbon risk? *Journal of Financial Economics*, 142(2), 517–549. <https://doi.org/10.1016/j.jfineco.2021.05.008>
- Broadstock, D. C., Chan, K., Cheng, L. T. W., & Wang, X. (2021). The role of ESG performance during times of financial crisis: Evidence from COVID-19 in China. *Finance Research Letters*, 38, 101716. <https://doi.org/10.1016/j.frl.2020.101716>
- Cardillo, M. A. dos R., & Basso, L. F. C. (2025). Revisiting knowledge on ESG/CSR and financial performance: A bibliometric and systematic review of moderating variables. *Journal of Innovation & Knowledge*, 10(1), 100648. <https://doi.org/10.1016/j.jik.2024.100648>
- Chen, S., & Wu, Z. (2025). Corporate ESG performance and stock pricing efficiency. *The North American Journal of Economics and Finance*, 79, 102440. <https://doi.org/10.1016/j.najef.2025.102440>
- Christensen, D. M., Serafeim, G., & Sikochi, A. (2022). Why is corporate virtue in the eye of the beholder? The case of ESG ratings. *The Accounting Review*, 97(1), 147–175. <https://doi.org/10.2308/TAR-2019-0506>
- Di Tommaso, C., & Mazzuca, M. (2023). The stock price of European insurance companies: What is the role of ESG factors? *Finance Research Letters*, 56, 104071. <https://doi.org/10.1016/j.frl.2023.104071>
- Flammer, C. (2021). Corporate green bonds. *Journal of Financial Economics*, 142(2), 499–516. <https://doi.org/10.1016/j.jfineco.2021.01.010>
- Gibson Brandon, R., Krueger, P., & Schmidt, P. S. (2021). ESG rating disagreement and stock returns. *Financial Analysts Journal*, 77(4), 104–127. <https://doi.org/10.1080/0015198X.2021.1963186>
- Gillan, S. L., Koch, A., & Starks, L. T. (2021). Firms and social responsibility: A review of ESG and CSR research in corporate finance. *Journal of Corporate Finance*, 66, 101889. <https://doi.org/10.1016/j.jcorpfin.2021.101889>
- Leite, B. J., & Uysal, V. B. (2023). Does ESG matter to investors? ESG scores and the stock price response to new information. *Global Finance Journal*, 57, 100851. <https://doi.org/10.1016/j.gfj.2023.100851>
- Lestari, S. I. (n.d.). The effect of ESG Risk Score and firm size on stock prices of companies listed in IDX ESG Leaders [Undergraduate thesis dataset].
- Martiny, A., Taglialatela, J., Testa, F., & Iraldo, F. (2024). Determinants of environmental, social and governance (ESG) performance: A systematic literature review. *Journal of Cleaner Production*, 456, 142213. <https://doi.org/10.1016/j.jclepro.2024.142213>
- Pástor, L., Stambaugh, R. F., & Taylor, L. A. (2021). Sustainable investing in equilibrium. *Journal of Financial Economics*, 142(2), 550–571. <https://doi.org/10.1016/j.jfineco.2020.12.011>
- Pedersen, L. H., Fitzgibbons, S., & Pomorski, L. (2021). Responsible investing: The ESG-efficient frontier. *Journal of Financial Economics*, 142(2), 572–597. <https://doi.org/10.1016/j.jfineco.2020.11.001>

- Wang, L., Ji, Y., & Ni, Z. (2023). Spillover of stock price crash risk: Do environmental, social and governance (ESG) matter? *International Review of Financial Analysis*, 89, 102768. <https://doi.org/10.1016/j.irfa.2023.102768>
- Xu, Z., Liu, D., Li, Y., & Guo, F. (2025). ESG and stock price volatility risk: Evidence from Chinese A-share market. *The North American Journal of Economics and Finance*, 75, 102277. <https://doi.org/10.1016/j.najef.2024.102277>