Impact of Rate of Change in ESG Scores on Firm Value and Pricing

Kally Zheng
Leonard N. Stern School of Business
Glucksman Institute for Research

Faculty Advisor: Irina Luneva, PhD.

Director: Theresa Kuchler
April 2026

Abstract

Environmental, social, and governance (ESG) ratings have become central to investment decisions, corporate strategy, and regulatory disclosure frameworks. While a large body of research examines the level of ESG performance and its relation to firm value, much less is known about the rate of change in ESG scores—or how quickly firms improve or decline on ESG dimensions—and the implications for market pricing and valuation.

This project investigates whether the rate of change in ESG ratings, calculated consistently across multiple providers, has predictive power for firm value and pricing metrics such as stock price, cost of capital, price-to-earnings (P/E) ratio, price-to-book (P/B) ratio, and debt-to-equity (D/E) ratio. It also tests whether one rating agency's measure of ESG momentum is more strongly associated with valuation than others, shedding light on how investors interpret dynamic ESG performance and on the information quality of competing ESG data providers.

1. Introduction

Environmental, social, and governance (ESG) ratings have become central to investment decisions, corporate strategy, and regulatory disclosure frameworks. ESG considerations are now embedded in mainstream investing, with more than 3,000 institutional investors representing over US $100 trillion in assets committing to integrate ESG information into their decision-making processes (Krueger et al., 2020). Corporations are also incorporating ESG principles into their strategic planning: fifty-three percent of CFOs report that they have already embedded ESG principles into their core business strategy or are actively working toward doing so (**?**). The total assets managed under ESG strategies have grown rapidly, with ESG-labeled funds now representing trillions in global AUM (Friede et al., 2015).

Despite this growth, one fundamental question remains unresolved: do markets reward firms for improving their ESG performance, or only for maintaining high ESG levels? Most research focuses on static ESG ratings, which provide cross-sectional measures of a firm's sustainability profile at a single point in time. However, the evidence on how ESG levels relate to valuation is mixed. Some studies find that firms with higher ESG scores enjoy lower costs of capital and higher valuations (**?**Chava, 2014), while others document a "brown premium," where firms with worse environmental performance earn higher expected returns, suggesting a valuation discount rather than a premium (Bolton and Kacperczyk, 2021).

A comprehensive meta-analysis by the NYU Stern Center for Sustainable Business and Rockefeller Asset Management, which reviewed more than 1,000 studies published between 2015 and 2020, found that while 58 percent of corporate-level studies reported a positive relationship between ESG and financial performance, ESG portfolios built around top-rated firms often performed comparably to the S&P 500 (Whelan et al., 2021). This ambiguity suggests that high ESG scores alone do not guarantee superior valuation or market performance.

Static ESG levels are also limited in what they reveal about managerial quality or adaptability. A renewable-energy company, for example, will naturally score higher on environmental metrics than a steel producer, even if the latter is making rapid progress on decarbonization. Focusing only on ESG levels therefore risks conflating inherent industry characteristics with managerial effort. Recent research suggests that investors may respond less to where a firm currently stands than to where it is heading. The rate of change in ESG performance—meaning how quickly a firm improves or deteriorates—captures dynamic elements of strategy, innovation, and risk management. By isolating ESG momentum, we can test whether markets reward firms that are actively transitioning toward more sustainable practices rather than those that simply maintain high static scores.

A further complication is that ESG ratings are not standardized across data providers. Major agencies such as MSCI, Sustainalytics, and Refinitiv frequently disagree on firm-level ESG performance because of differences in scope, weighting, and data treatment. Berg et al. (2022) find that correlations between leading ESG raters can be as low as 0.38, meaning that the same firm can appear as a sustainability leader in one dataset and a laggard in another. This inconsistency makes it difficult to compare firms or assess improvement over time. Understanding how ESG momentum is captured within each provider's framework offers insight into whether markets interpret these divergent signals consistently or whether some methodologies better align with valuation outcomes.

This paper contributes to the literature by shifting the focus from ESG levels to ESG momentum, and by evaluating its relationship with valuation multiples rather than returns alone. It examines whether changes in ESG performance, rather than static ESG levels, are associated with firm valuation. While prior literature has primarily focused on ESG levels or their relationship with stock returns, this paper centers on ESG momentum, defined as the rate of change in ESG scores over time. The primary focus is on valuation multiples, particularly price-to-earnings (P/E) and EV/EBITDA, which reflect how markets price

firms relative to their earnings. Additional analyses consider accounting performance and capital structure outcomes to assess whether any observed valuation effects are supported by underlying fundamentals.

Understanding how ESG improvement, rather than level alone, affects firm value can provide a more nuanced view of sustainable investing. If upward ESG momentum predicts changes in valuation, it would suggest that markets reward firms that are actively enhancing their ESG practices and signaling adaptability and long-term orientation. However, there are strong reasons to expect limited or no effects. ESG improvements may be gradual, anticipated, or already incorporated into expectations, limiting their incremental impact on pricing. In addition, measurement noise and disagreement across ESG ratings can obscure true changes, weakening any observable relationship. Competing mechanisms further complicate interpretation: while ESG improvements may enhance reputation or reduce perceived risk, they may also require short-term investments that compress margins or reduce near-term profitability.

Consistent with these competing hypotheses, the results of this study show limited and heterogeneous effects of ESG momentum. Statistically significant relationships are concentrated in earnings-based valuation multiples, particularly P/E and EV/EBITDA at longer horizons, while most accounting and capital structure outcomes exhibit no significant association. This pattern suggests that ESG momentum is not broadly reflected in firm fundamentals, but may influence how markets price earnings over time.

2. Literature Review

2.1 ESG Performance and Firm Value

The relationship between environmental, social, and governance (ESG) performance and firm value has been studied extensively, yet findings remain mixed. Early research linked higher ESG performance to improved financial outcomes through reduced risk, enhanced reputation,

and stronger stakeholder relations. **?** find that firms with better social responsibility enjoy lower costs of equity, while Chava (2014) reports that environmentally responsible firms obtain cheaper debt financing. A meta-analysis by Friede et al. (2015), covering more than 2,000 studies, concludes that nearly 90 percent find a non-negative relationship between ESG and financial performance, suggesting that sustainability efforts generally support firm fundamentals rather than detract from them.

Empirical results, however, vary widely. Some studies document that ESG investments enhance profitability and valuation through innovation, customer loyalty, and improved governance (**??**), while others argue that ESG expenditures can depress short-term earnings (**?**). Whelan et al. (2021) review more than 1,000 studies and report that 58 percent show positive relationships between ESG and financial outcomes, yet ESG portfolios often perform comparably to benchmarks such as the S&P 500. These mixed results imply that ESG's contribution to value may stem more from lower discount rates or reduced risk than from direct return enhancement.

The strength of this relationship also depends on how firm value is measured. Many studies use stock returns as a proxy for financial performance, but valuation ratios such as price-to-earnings (P/E) and price-to-book (P/B) are more directly relevant to investor decision-making. Derwall et al. (2005) find that firms with higher eco-efficiency trade at valuation premiums in both P/E and P/B, indicating that markets reward sustainability as a signal of profitability. Similarly, Buallay (2019) shows that banks with stronger ESG disclosure quality exhibit higher P/B ratios and lower risk, while Atilgan et al. (2021) find that ESG scores are positively related to valuation multiples across European firms. Giese et al. (2019) and Grewal et al. (2020) further demonstrate that greater ESG transparency can drive multiple expansion by reducing information asymmetry.

Despite these positive associations, results differ across industries and time periods. In cyclical or heavy-emitting sectors, environmental scores often drive valuation premiums, while

governance and social dimensions dominate in financial and technology firms (Atilgan et al., 2021). This heterogeneity exposes a key limitation of focusing only on static ESG levels: cross-sectional comparisons conflate industry effects with managerial quality and strategic improvement.

2.2 ESG Momentum and Market Pricing

To overcome these limitations, researchers have begun examining the rate of change in ESG performance, or ESG momentum, as a dynamic indicator of managerial responsiveness and value creation. ESG momentum captures how quickly a firm improves or deteriorates on ESG dimensions, reflecting adaptability rather than baseline industry conditions.

Khan et al. (2016) find that firms improving on financially material ESG issues outperform peers with stagnant scores, suggesting investors price progress over position. Clark and Lalit (2020) report that ESG "improvers" earn higher risk-adjusted returns, particularly in industries facing regulatory or reputational change. Giese et al. (2019) show that upgrades in ESG ratings correspond to upward revisions in valuation multiples, largely via lower perceived risk, while Grewal et al. (2020) demonstrate that improved ESG disclosure quality raises firm valuations by reducing information asymmetry.

Additional studies strengthen this evidence. Nagy et al. (2016) find that portfolios emphasizing firms with upward ESG revisions outperform static ESG-tilt strategies, driven by firm-specific factors. Consolandi et al. (2022) show that ESG momentum yields positive equity performance, especially in industries with high ESG materiality, and Shanaev and Ghimire (2022) document that rating upgrades lead to modest positive returns while downgrades produce significant negative ones. Sverner et al. (2023) confirm that ESG upgrades are associated with excess returns, although effects weaken when controlling for systematic risk. Collectively, these studies indicate that markets incorporate ESG improvements unevenly but that positive momentum tends to coincide with valuation gains.

Other research connects ESG improvement to financing advantages. Dhaliwal et al. (2014) find that firms voluntarily disclosing sustainability information face lower implied costs of equity, while Oikonomou et al. (2014) show that strong ESG performance reduces both equity and debt costs. These results imply that ESG momentum can influence both earnings expectations and discount rates, affecting valuation ratios such as P/E, P/B, and debt-to-equity (D/E).

2.3 Mechanisms Linking ESG Momentum to Valuation

Two mechanisms explain why ESG momentum may be reflected in valuation metrics: the earnings channel and the discount-rate channel. The earnings channel suggests that ESG improvement enhances long-term profitability through operational efficiency, innovation, and stakeholder trust. Firms demonstrating credible ESG progress may achieve sustained revenue growth and higher future cash flows, leading to elevated P/E and P/B ratios (Dhaliwal et al., 2011; Derwall et al., 2005).

The discount-rate channel centers on risk perception. ESG improvement signals stronger governance and lower exposure to environmental or regulatory shocks, prompting investors to demand a lower rate of return. This translates into cheaper financing and higher firm valuation (**?**Chava, 2014). Giese et al. (2019) show that firms experiencing ESG upgrades exhibit both lower volatility and multiple expansion, while Ilhan et al. (2021) find that ESG progress reduces tail-risk exposure. Moreover, firms with rising ESG profiles gain access to lower-spread credit instruments such as green bonds and sustainability-linked loans (Tang and Zhang, 2020; c, 2021).

Together, these mechanisms explain how ESG momentum may affect both components of firm valuation: expectations of earnings and required rates of return.

2.4 Divergence Among ESG Rating Agencies

A persistent obstacle to ESG analysis is the lack of standardization across rating providers. Correlations between major agencies such as MSCI, Sustainalytics, and Refinitiv range from

0.38 to 0.71 (**?**). Divergence stems from differences in scope, weighting, indicator definitions, and treatment of qualitative data. Even after adjusting for these design variations, significant unexplained dispersion remains, indicating that ESG scores combine both objective data and subjective judgment (Christensen et al., 2022).

This inconsistency complicates the measurement of ESG momentum. Agencies differ in update frequency and smoothing methods, so identical firms may appear to be improving rapidly under one system and stagnating under another (Berg et al., 2022). Such discrepancies affect empirical results and can influence investment decisions. Anselmi and Petrella (2025) find that divergence between Bloomberg and Refinitiv scores leads to differences in P/B ratios, implying that investors price certain data sources more heavily. Gibson et al. (2021) show that markets assign greater credibility to rating providers perceived as transparent or financially material.

Comparing ESG momentum measures across multiple datasets can therefore reveal which methodologies best align with investor behavior and valuation outcomes.

2.5 Summary and Research Gap

Existing research shows that ESG improvements can influence firm value through profitability and risk channels, but the effects vary with industry, materiality, and time horizon. Improvements in financially material ESG issues—those most relevant to a firm's business model—produce stronger valuation effects than changes in peripheral areas (Khan et al., 2016). Short-term studies capture immediate market reactions, whereas valuation ratios such as P/E and P/B reflect longer-term adjustments as firms demonstrate sustained operational progress.

Despite this progress, important gaps remain. First, most empirical work examines ESG levels rather than changes, leaving limited understanding of how ongoing improvement affects valuation metrics central to investors. Second, while ESG's relationship with stock returns

and financing costs is well-documented, few studies test whether ESG momentum translates into measurable shifts in P/E, P/B, or D/E ratios. By focusing on investor-facing measures and cross-provider comparisons, the research aims to clarify how markets interpret ESG progress and which data sources best capture that relationship.

3. Data

3.1 Data Sources

This study combines firm-level ESG data with financial statement and market valuation information to examine the relationship between changes in ESG performance and firm outcomes. ESG measures are obtained from the LSEG (Refinitiv) ESG database, which provides annual composite ESG scores, pillar scores (Environmental, Social, Governance), and a range of underlying subcomponent indicators for publicly listed firms. ESG scores are constructed from company disclosures, public filings, and third-party data sources and are reported on a standardized scale.

Financial and accounting data are drawn from Compustat Capital IQ Fundamentals Annual. This database provides standardized balance sheet, income statement, and cash flow information. Market capitalization is measured using Compustat's annual market value of equity (`mkvalt`), ensuring alignment with fiscal-year accounting variables.

3.2 Sample Construction and Firm Matching

Firm-level ESG data are merged with Compustat financial data using CUSIP identifiers and fiscal year. The use of CUSIP matching restricts the sample to firms with U.S. security identifiers and ensures consistent alignment of firm-year observations across databases. This approach yields a panel consisting primarily of U.S.-listed firms and enhances comparability in accounting standards and disclosure regimes.

The sample retains consolidated industrial-format financial statements (`datafmt = "STD"`,

`indfmt = "INDL"`, `consol = "C"`), following established conventions in empirical accounting and valuation research. Firm-year observations with missing fiscal year identifiers or inconsistent security identifiers are excluded.

The final panel is structured at the firm–year level. Sample sizes vary across analyses depending on the availability of lagged ESG variables and specific financial ratios.

Table 1: Sample Construction

Step	Description	Firm-Years	Firms	Years
(1)	Merged ESG–Compustat panel	35,503	4,455	2002–2025
(2)	Eligible for 1-year ESG momentum	17,398	—	—
(3)	Eligible for 3-year ESG momentum	17,398	—	—
(4)	Eligible for 5-year ESG momentum	12,213	—	—

Notes: This table reports the construction of the final firm-year panel used in the regression analyses. The sample begins with the merged ESG–Compustat dataset and sequentially applies ESG momentum and outcome eligibility requirements. The one- and three-year specifications require at least two and four consecutive ESG observations, respectively. The five-year specification requires six consecutive ESG observations, resulting in a smaller estimation sample.

Table 2: Sample Sizes by Outcome Variable

Outcome Variable	1Y Sample	3Y Sample	5Y Sample	Sample Restrictions
P/E	14,038	14,038	10,269	Positive earnings required for log transform
EV/EBITDA	15,242	15,242	11,036	Positive EBITDA required
P/B	17,398	17,398	12,213	No denominator restriction
FCF Yield	17,398	17,398	12,213	Defined for full core sample
D/E	17,398	17,398	12,213	Non-missing debt and equity
ROA	17,398	17,398	12,213	Non-missing accounting data
ROE	17,398	17,398	12,213	Non-missing accounting data
Operating Margin	18,030	18,030	12,720	Availability differs slightly due to construction
Interest Coverage	13,548	13,548	10,093	Positive coverage required for log transform

4. Methodology

4.1 ESG Momentum Construction

The primary explanatory variables capture changes in firm-level ESG performance over time rather than static ESG levels. Emphasizing changes rather than levels addresses two well-documented issues in the ESG literature.

First, ESG ratings differ substantially across providers due to variation in measurement scope, weighting schemes, and aggregation methods (Berg et al., 2022). Static ESG levels may therefore reflect provider-specific methodology or persistent industry composition rather than meaningful performance improvements.

Second, prior evidence suggests that financially material improvements in ESG performance are more strongly associated with firm outcomes than unconditional ESG levels (Khan et al., 2016). Motivated by this logic, the empirical design focuses on within-firm ESG changes.

For firm i, ESG dimension j, and fiscal year t, ESG momentum over horizon k is defined as:

$$\text{ESG Momentum}_{i,j}^{(k)} = \text{ESG}_{i,j,t-1} - \text{ESG}_{i,j,t-k} \tag{1}$$

where $k \in \{2, 4, 6\}$ corresponds to one-year, three-year, and five-year horizons, respectively. The construction relies exclusively on lagged ESG information to ensure temporal ordering relative to financial outcomes measured in year t. Observations lacking sufficient historical data are excluded from the relevant horizon regressions.

This simple-difference specification preserves economic interpretability: positive momentum reflects ESG improvement, while negative momentum reflects deterioration.

4.2 Financial Outcomes

This study examines both valuation and operating outcomes commonly used in empirical asset pricing and accounting research. The primary valuation measures include the price-to-earnings ratio (P/E), price-to-book ratio (P/B), enterprise value to EBITDA (EV/EBITDA), and free cash flow yield. Book-based valuation metrics, particularly price-to-book, are central to the asset pricing literature and form the foundation of the value factor documented by Fama and French (1992). Earnings-based multiples such as P/E are widely employed in accounting-based valuation frameworks (**?**). EV/EBITDA is frequently used in corporate finance and transaction valuation because it abstracts from capital structure differences and accounting depreciation policies. Free cash flow yield provides a cash-based valuation metric that mitigates accrual distortions and captures equity valuation relative to internally generated cash flows.

In addition to valuation outcomes, the analysis includes measures of operating performance and financial risk. Operating performance is measured using return on assets (ROA), return on equity (ROE), and operating margin. Financial risk and capital structure are captured using the debt-to-equity ratio and the interest coverage ratio, which reflect leverage and debt servicing capacity.

Financial variables are constructed using Compustat annual data aligned with fiscal-year reporting. To mitigate the influence of extreme observations, continuous financial variables are winsorized at the 1st and 99th percentiles. Valuation multiples that exhibit substantial right skewness, including P/E and EV/EBITDA, are log-transformed to improve distributional properties. For ratios requiring positive denominators, observations with non-positive denominators are excluded prior to transformation.

4.3 Control Variables

To isolate the association between ESG momentum and financial outcomes, the empirical specifications include a parsimonious set of time-varying firm-level controls:

- **Firm Size**: Measured as the natural logarithm of market capitalization ($\log \mathrm{MV}_{i,t}$). Larger firms tend to exhibit higher ESG scores and trade at different valuation multiples (Fama and French, 1992).
- **Growth**: Measured as the annual log change in total assets. Asset growth is widely used in accounting and asset pricing research as a forward-looking proxy for expansion and investment activity (**?**).
- **Investment Intensity**: Measured as capital expenditures scaled by total assets ($\mathrm{CapexInt}_{i,t}$). Scaling standardizes investment across firms of different sizes (**?**).
- **Operating Risk**: Proxied using five-year rolling volatility of return on assets ($\sigma(\mathrm{ROA})_{i,t}^{(5)}$). Earnings volatility is negatively associated with valuation in both accounting and asset pricing contexts.

All primary specifications include firm and fiscal year fixed effects. Firm fixed effects absorb time-invariant firm characteristics such as persistent business model differences, governance culture, and long-run ESG orientation. Year fixed effects capture macroeconomic shocks and time-varying ESG sentiment common to all firms.

Standard errors are clustered at the firm level to account for serial correlation within firms over time (Petersen, 2009).

4.4 Regression Specification

For firm i in fiscal year t, the baseline specification estimated is:

$$Y_{i,t} = \alpha_i + \delta_t + \beta_k \cdot \text{ESG Momentum}_i^{(k)} + \gamma' \mathbf{X}_{i,t} + \varepsilon_{i,t} \tag{2}$$

where $Y_{i,t}$ is the financial outcome of interest, α_i denotes firm fixed effects, δ_t denotes year fixed effects, ESG Momentum$_i^{(k)}$ is as defined in Equation (1), and $\mathbf{X}_{i,t}$ is the time-varying control vector:

$$\mathbf{X}_{i,t} = \left[\log(\text{MV})_{i,t},\ \text{AG}_{i,t},\ \text{CapexInt}_{i,t},\ \sigma(\text{ROA})_{i,t}^{(5)}\right] \tag{3}$$

Under the firm fixed-effects specification, β_k is interpreted as the partial association between a within-firm change in ESG momentum over horizon k and the contemporaneous outcome $Y_{i,t}$, comparing the firm to itself over time while holding constant year effects and $\mathbf{X}_{i,t}$. This design explicitly avoids making the claim that "high-ESG firms have different outcomes than low-ESG firms" and instead targets whether changes in ESG performance within a given firm are related to changes in outcomes.

4.5 Outcome Variable Transformations

Financial ratios constructed from accounting data frequently exhibit extreme values and skewness due to small denominators, transitory earnings shocks, or leverage effects. Continuous financial outcome variables are winsorized at the 1st and 99th percentiles within the pooled sample prior to estimation.

Valuation multiples that exhibit substantial right-skewness are log-transformed. Specifically, P/E, EV/EBITDA, and interest coverage are transformed using the natural logarithm. For ratios requiring positive denominators, observations with non-positive denominators are excluded prior to transformation.

5. Results

5.1 Descriptive Statistics

Table 3 reports summary statistics for ESG momentum measures, financial outcomes, and control variables. ESG momentum exhibits substantial within-firm and cross-sectional

variation across all horizons. The mean one-year ESG momentum is modestly positive, indicating that firms on average experience incremental improvements in ESG performance over time. Multi-year momentum measures display greater spread, consistent with cumulative ESG changes over longer horizons.

Valuation multiples exhibit the expected right-skewed distributions prior to transformation. Log-transformations applied to P/E and EV/EBITDA materially reduce skewness while preserving economic interpretation. Sample sizes vary across outcome variables due to denominator restrictions and the lag structure required to construct ESG momentum measures.

Table 3: Descriptive Statistics

Variable	Mean	SD	P25	Median	P75	N
ESGScore_mom1y	0.021	0.069	−0.020	0.012	0.053	26,943
ESGScore_mom3y	0.066	0.110	−0.007	0.052	0.128	19,692
ESGScore_mom5y	0.112	0.136	0.017	0.098	0.194	13,794
log(P/E)	3.043	0.917	2.530	2.947	3.410	24,426
log(EV/EBITDA)	2.415	0.813	2.001	2.352	2.735	26,890
log(P/B)	0.931	0.953	0.298	0.821	1.436	31,527
FCF Yield	0.017	0.178	−0.003	0.042	0.079	32,897
ROA	−0.010	0.357	−0.002	0.027	0.070	35,485
ROE	0.029	0.442	0.003	0.093	0.172	33,876
Operating Margin	0.107	0.260	0.041	0.120	0.241	34,502
log(D/E)	0.601	0.566	0.194	0.478	0.823	33,766
log(IC)	2.174	1.254	1.304	1.945	2.731	24,237
log(MV)	7.838	1.821	6.624	7.866	9.002	33,041
Asset Growth	0.076	0.244	−0.017	0.049	0.135	31,038
Capex Intensity	0.037	0.052	0.004	0.021	0.049	35,336
ROA Volatility	0.052	0.122	0.011	0.026	0.057	19,677

Notes: This table reports summary statistics for all variables used in the regression analyses. Continuous financial variables are winsorized at the 1st and 99th percentiles. IC denotes interest coverage; MV denotes market capitalization.

5.2 Correlation Analysis

Table 4 presents pairwise correlations among ESG momentum, financial outcomes, and control variables. ESG momentum is only weakly correlated with firm size, asset growth, capital expenditure intensity, and earnings volatility, supporting the stability of multivariate regression specifications. Although several accounting variables exhibit moderate correlations

(e.g., ROA and ROE), variance inflation factor diagnostics indicate no evidence of problematic multicollinearity in the regression models.

Table 4: Pairwise Correlation Matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1) ESG mom.	1.00													
(2) log(P/E)	0.02	1.00												
(3) log(EV/EBITDA)	0.01	0.57	1.00											
(4) log(P/B)	0.02	0.34	0.40	1.00										
(5) FCF Yield	0.01	−0.14	−0.22	0.01	1.00									
(6) ROA	0.02	−0.21	−0.07	0.06	0.27	1.00								
(7) ROE	0.01	−0.26	−0.09	0.10	0.35	0.70	1.00							
(8) Op. Margin	−0.00	−0.22	−0.23	−0.06	0.39	0.48	0.52	1.00						
(9) log(D/E)	−0.00	−0.05	0.05	0.29	0.00	−0.02	−0.01	0.07	1.00					
(10) log(IC)	0.00	−0.08	−0.03	0.25	0.05	0.34	0.24	0.10	−0.50	1.00				
(11) log(MV)	0.02	0.12	0.14	0.39	0.22	0.24	0.35	0.29	0.09	0.17	1.00			
(12) Asset Growth	0.03	0.08	0.12	0.15	0.09	0.24	0.18	0.12	−0.03	0.12	0.14	1.00		
(13) Capex Int.	0.00	−0.02	−0.10	0.01	−0.20	−0.02	0.04	−0.07	−0.03	0.06	0.06	0.00	1.00	
(14) ROA Vol.	−0.02	−0.07	0.03	0.03	−0.19	−0.56	−0.31	−0.30	−0.08	0.02	−0.21	−0.17	0.18	1.00

5.3 Valuation Outcomes

Table 5 reports firm fixed effects regressions of valuation multiples on ESG momentum across one-year, three-year, and five-year horizons. All specifications include firm and year fixed effects, time-varying firm controls, and firm-clustered standard errors.

Table 5: Valuation Outcomes: Firm Fixed Effects Regressions

Metric	1Y	3Y	5Y
EV/EBITDA	-0.043	-0.132^{**}	-0.178^{***}
	(0.057)	(0.053)	(0.062)
	$N = (15{,}242,\ 15{,}242,\ 11{,}036)$; $R^2 = (0.727,\ 0.727,\ 0.736)$		
FCF Yield	-0.015	-0.007	-0.010
	(0.012)	(0.010)	(0.010)
	$N = (17{,}398,\ 17{,}398,\ 12{,}213)$; $R^2 = (0.607,\ 0.607,\ 0.596)$		
P/B	-0.038	-0.051	-0.084
	(0.044)	(0.046)	(0.059)
	$N = (17{,}398,\ 17{,}398,\ 12{,}213)$; $R^2 = (0.878,\ 0.878,\ 0.886)$		
P/E	-0.167^{**}	-0.139^{**}	-0.134^{**}
	(0.070)	(0.060)	(0.063)
	$N = (14{,}038,\ 14{,}038,\ 10{,}269)$; $R^2 = (0.728,\ 0.728,\ 0.723)$		

Notes: Entries report coefficient estimates from firm fixed effects regressions of valuation outcomes on ESG momentum. Firm-clustered standard errors are reported in parentheses. All specifications include firm and year fixed effects and time-varying firm controls. Dependent variables log(P/E) and log(EV/EBITDA) are log-transformed. Significance levels are denoted as follows: $^{**}p < 0.05$ and $^{***}p < 0.01$. Standard errors are reported in parentheses.

Price-to-Earnings (P/E). Across all three horizons, ESG momentum is negatively associated with log(P/E). The coefficients are statistically significant at conventional levels in the one-year, three-year, and five-year specifications. Because identification arises from within-firm changes, the negative coefficients reflect how valuation multiples adjust when a given firm improves its ESG score relative to its own historical trajectory.

Enterprise Value to EBITDA (EV/EBITDA). Results for EV/EBITDA exhibit horizon dependence. The one-year momentum specification is not statistically significant. However, the three-year and five-year momentum measures are negative and statistically

significant, with larger magnitudes at longer horizons. These results indicate that sustained ESG improvements are associated with lower enterprise value multiples relative to operating earnings.

Price-to-Book (P/B). Coefficients are negative across all horizons but statistically insignificant once time-invariant firm characteristics are absorbed through firm fixed effects.

Free Cash Flow Yield. Free cash flow yield shows no statistically significant association with ESG momentum across horizons.

5.4 Operating Performance and Risk

Table 6 reports firm fixed effects regressions for profitability, operating performance, leverage, and debt servicing capacity.

Table 6: Operating Performance and Financial Risk: Firm Fixed Effects Regressions

Metric	1Y	3Y	5Y
D/E	−0.018	−0.015	−0.064
	(0.030)	(0.033)	(0.042)
	$N = (17{,}398,\ 17{,}398,\ 12{,}213)$;	$R^2 = (0.805,\ 0.805,\ 0.817)$	
Interest Coverage	−0.038	0.042	0.131
	(0.080)	(0.086)	(0.098)
	$N = (13{,}548,\ 13{,}548,\ 10{,}093)$;	$R^2 = (0.795,\ 0.795,\ 0.806)$	
Operating Margin	0.007	0.022**	0.020*
	(0.012)	(0.010)	(0.012)
	$N = (18{,}030,\ 18{,}030,\ 12{,}720)$;	$R^2 = (0.813,\ 0.813,\ 0.796)$	
ROA	−0.006	0.002	0.008
	(0.010)	(0.009)	(0.007)
	$N = (17{,}398,\ 17{,}398,\ 12{,}213)$;	$R^2 = (0.775,\ 0.775,\ 0.683)$	
ROE	−0.020	−0.008	0.008
	(0.037)	(0.030)	(0.031)
	$N = (17{,}398,\ 17{,}398,\ 12{,}213)$;	$R^2 = (0.623,\ 0.623,\ 0.621)$	

Notes: Entries report coefficient estimates from firm fixed effects regressions of operating performance and financial risk outcomes on ESG momentum. Standard errors, clustered at the firm level, are reported in parentheses. All specifications include firm and year fixed effects and time-varying firm controls. Significance levels are denoted as follows: $^{*}p < 0.10$ and $^{**}p < 0.05$.

Across all horizons, ESG momentum is not significantly associated with ROA or ROE. Operating margin displays a positive and statistically significant association with three-year ESG momentum. Debt-to-equity ratios and interest coverage exhibit no statistically significant association with ESG momentum across horizons.

5.5 Cross-Metric Summary

Statistically significant associations are concentrated in earnings-based valuation multiples (P/E and EV/EBITDA), particularly at longer momentum horizons. Book-based valuation (P/B), cash flow-based valuation (FCF yield), profitability measures (ROA and ROE), leverage, and debt servicing capacity exhibit limited sensitivity to ESG momentum once firm and year fixed effects are included.

5.6 Economic Magnitude

Table 7: Economic Magnitude of ESG Momentum Effects

Horizon	Metric	Estimate	σ_{ESG}	% Effect (1 SD)
1Y	EV/EBITDA	−0.043	0.069	−0.30%
3Y	EV/EBITDA	−0.132	0.110	−1.45%
5Y	EV/EBITDA	−0.178	0.136	−2.41%
1Y	P/E	−0.167	0.069	−1.15%
3Y	P/E	−0.139	0.110	−1.53%
5Y	P/E	−0.134	0.136	−1.82%

Notes: σ_{ESG} denotes the within-sample standard deviation of ESG momentum. The reported percentage effect corresponds to the approximate semi-elasticity implied by a one standard deviation increase in ESG momentum, given the log-transformed dependent variable.

A one standard deviation increase in ESG momentum corresponds to an approximate 1.1 percent decline in P/E at the one-year horizon, 1.5 percent at the three-year horizon, and 1.8 percent at the five-year horizon. Comparable scaling of the EV/EBITDA coefficients yields similarly modest percentage effects at longer horizons. These calculations indicate that the estimated effects, while statistically detectable in certain specifications, are economically limited in size.

6. Discussion

The results indicate that ESG momentum effects are limited and metric-dependent. Within-firm improvements in ESG performance are associated with modest declines in earnings-based valuation multiples, while most accounting profitability measures and capital structure metrics show no systematic response.

6.1 Earnings-Based Valuation Compression

The most consistent finding is the negative association between ESG momentum and earnings-based valuation multiples. A one standard deviation increase in ESG momentum is associated with an approximate 1.1–1.8 percent decline in log(P/E), depending on the horizon, and up to a 2.4 percent decline in log(EV/EBITDA) at the five-year horizon.

This finding is not consistent with a simple "green premium" narrative in which ESG improvements uniformly increase firm valuation. Instead, it suggests either multiple compression or denominator effects linked to earnings dynamics. A decline in valuation multiples may arise because market prices adjust downward relative to earnings, or because earnings rise faster than market value. However, the absence of statistically significant changes in ROA and ROE suggests that the observed multiple compression is more consistent with changes in market expectations, discount rates, or growth assumptions embedded in earnings-based valuation metrics.

6.2 Absence of Broad Profitability Effects

Across all horizons, ESG momentum is not significantly associated with ROA or ROE. This finding is important in light of prior research suggesting that financially material ESG investments may improve operating performance (Khan et al., 2016). The present results do not contradict that literature directly, as this study examines aggregate ESG momentum rather than financially material subcomponents. Nonetheless, the absence of profitability effects

suggests that within-firm ESG improvements do not translate into immediate accounting performance gains over the horizons examined.

6.3 Market Pricing vs. Accounting Channels

The divergence between valuation multiples and accounting profitability measures suggests that ESG momentum may influence forward-looking components of valuation rather than contemporaneous operating performance. Earnings-based multiples incorporate expectations about long-run growth and required returns. If ESG improvements alter perceived risk, investor clientele, or long-run capital allocation strategies, these effects may be capitalized into valuation ratios even in the absence of immediate profitability changes.

The fact that book-based valuation (P/B) does not respond significantly suggests that ESG improvements may not meaningfully alter book value expectations or residual income frameworks. Similarly, the lack of systematic response in leverage and interest coverage indicates that ESG changes are not mechanically associated with capital structure adjustments.

6.4 Economic Magnitude and Interpretation

Although statistically significant in several specifications, the implied economic magnitudes are modest relative to the cross-sectional dispersion of valuation multiples. The standard deviation of log(P/E) is approximately 0.92, whereas a one standard deviation change in ESG momentum corresponds to a 1–2 percent change in valuation. Thus, ESG momentum explains only a small portion of overall variation in earnings-based valuation ratios.

Accordingly, the results should be interpreted as documenting associations rather than substantial financial revaluations. The evidence does not support strong claims that ESG improvements materially increase firm profitability or systematically enhance firm valuation.

6.5 Identification and Limitations

Despite the inclusion of firm and year fixed effects and firm-clustered standard errors, the design remains observational. Time-varying omitted variables may influence both ESG momentum and financial outcomes. In addition, ESG measurement error—documented extensively in the literature (Berg et al., 2022)—may attenuate estimated coefficients and obscure true relationships. Therefore, the findings should not be interpreted as causal effects of ESG improvements on firm valuation or performance.

7. Conclusion

This study examines whether changes in firm-level ESG performance—measured as ESG momentum—are associated with changes in firm valuation, operating performance, and financial structure. Using a panel of U.S.-listed firms matched between LSEG (Refinitiv) ESG data and Compustat financial statements, the analysis focuses on within-firm variation and employs firm and year fixed effects to isolate changes in ESG performance relative to a firm's own historical trajectory.

The empirical results indicate that ESG momentum effects are limited and metric-dependent. Within-firm improvements in ESG scores are associated with modest declines in earnings-based valuation multiples (P/E and EV/EBITDA), particularly over multi-year horizons. In contrast, book-based valuation (P/B), free cash flow yield, leverage, interest coverage, and core profitability measures (ROA and ROE) exhibit little systematic sensitivity to ESG momentum once firm and year fixed effects are included. The economic magnitudes of the detected valuation effects are statistically detectable but modest relative to the dispersion of the underlying financial ratios. Taken together, the evidence does not support a broad "green premium" narrative nor strong claims that ESG improvements translate into immediate profitability gains. Instead, the findings suggest that market pricing responses to ESG changes are concentrated in specific earnings-based constructs and do not reflect pervasive shifts in

accounting performance or capital structure.

These findings also suggest a more specific valuation mechanism. In standard valuation models, earnings-based multiples such as P/E depend on expectations of future earnings growth and the required rate of return. **?** show that equity value is linked to expected earnings and short- and long-run earnings growth, implying that changes in P/E can reflect revisions in growth expectations rather than only changes in current profitability. The results in this study do not show broad improvements in ROA or ROE alongside ESG momentum. As a result, the negative association between ESG momentum and earnings-based valuation multiples appears more consistent with modest downward revisions in how markets price near- to medium-term earnings, or with transitional costs of ESG improvement that are not yet offset by observable profitability gains, than with a generalized valuation premium for ESG progress.

More broadly, these results contribute to the ESG literature by emphasizing dynamic within-firm changes rather than static ESG levels, thereby mitigating cross-sectional bias stemming from persistent firm characteristics and rating-provider differences. Future research may extend this framework by incorporating alternative ESG data providers, examining financially material ESG subdimensions, or exploring more directly whether ESG momentum affects valuation through earnings expectations, discount rates, or investment-related transition costs. Overall, the evidence suggests that ESG momentum is neither irrelevant nor transformational for firm financial outcomes; rather, its effects appear targeted, moderate in magnitude, and contingent on the financial metric under consideration.

References

Anselmi, G., & Petrella, G. (2025). ESG ratings: Disagreement across providers and effects on stock returns. *Journal of International Financial Markets, Institutions and Money*, 100.

Atilgan, Y., Demirtaş, K. O., & Şanlısoy, A. (2021). ESG scores and valuation multiples across European firms. *Journal of Asset Management*.

Berg, F., Kölbel, J. F., & Rigobon, R. (2022). Aggregate confusion: The divergence of ESG ratings. *Review of Finance*, 26(6), 1315–1352.

Berg, F., Fabisik, K., & Sautner, Z. (2022). Is history repeating itself? The (un)predictable past of ESG ratings. *ECGI Finance Working Paper*.

Bolton, P., & Kacperczyk, M. (2021). Do investors care about carbon risk? *Journal of Financial Economics*, 142(2), 517–549.

Buallay, A. (2019). Is sustainability reporting associated with performance? *Management of Environmental Quality*.

Chava, S. (2014). Environmental externalities and cost of capital. *Management Science*, 60(9), 2223–2247.

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.

Clark, C., & Lalit, H. (2020). *ESG Improvers: An Alpha Enhancing Factor*. Rockefeller Capital Management.

Consolandi, C., et al. (2022). ESG momentum and equity performance: Evidence from European markets. *Journal of Sustainable Finance & Investment*.

Derwall, J., et al. (2005). The eco-efficiency premium puzzle. *Financial Analysts Journal*, 61(2), 51–63.

Dhaliwal, D. S., et al. (2011). Voluntary nonfinancial disclosure and the cost of equity capital. *The Accounting Review*, 86(1), 59–100.

Dhaliwal, D. S., et al. (2014). CSR disclosure and financial transparency. *Journal of Accounting and Public Policy*, 33(4), 328–355.

Fama, E. F., & French, K. R. (1992). The cross-section of expected stock returns. *Journal of Finance*, 47(2), 427–465.

Flammer, C. (2021). Corporate green bonds. *Journal of Financial Economics*, 142(2), 499–516.

Friede, G., Busch, T., & Bassen, A. (2015). ESG and financial performance. *Journal of Sustainable Finance & Investment*, 5(4), 210–233.

Gibson, R., Krueger, P., & Schmidt, P. S. (2021). ESG rating disagreement and stock returns. *Financial Analysts Journal*, 77(4), 67–88.

Giese, G., et al. (2019). Foundations of ESG investing. *Journal of Portfolio Management*, 45(5), 69–83.

Grewal, J., Hauptmann, C., & Serafeim, G. (2020). Material sustainability information and stock price informativeness. *Journal of Business Ethics*.

Ilhan, E., Sautner, Z., & Vilkov, G. (2021). Carbon tail risk. *Review of Financial Studies*, 34(3), 1540–1571.

Khan, M., Serafeim, G., & Yoon, A. (2016). Corporate sustainability: First evidence on materiality. *The Accounting Review*, 91(6), 1697–1724.

Krueger, P., Sautner, Z., & Starks, L. T. (2020). The importance of climate risks for institutional investors. *Review of Finance*.

Nagy, Z., et al. (2016). Can ESG add alpha? *Journal of Investing*, 25(2), 113–124.

Oikonomou, I., Brooks, C., & Pavelin, S. (2014). The financial effects of CSR. *Journal of Business Ethics*.

Petersen, M. A. (2009). Estimating standard errors in finance panel data sets. *Review of Financial Studies*, 22(1), 435–480.

Shanaev, S., & Ghimire, B. (2022). When ESG meets AAA: The effect of ESG rating changes on stock returns. *Finance Research Letters*, 46, 102302.

Sverner, J., et al. (2023). ESG rating upgrades and stock returns: Controlling for systematic risk. *Revista Brasileira de Finanças*.

Tang, D. Y., & Zhang, Y. (2020). Do shareholders benefit from green bonds? *Journal of Corporate Finance*, 61, 101427.

Whelan, T., Atz, U., Van Holt, T., & Clark, C. (2021). *ESG and Financial Performance*. NYU Stern Center for Sustainable Business and Rockefeller Asset Management.