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ESG disclosure tone and corporate profitability

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ABSTRACT

Sustainability ratings condense complex corporate activities into comparable indicators, but investors encounter those indicators alongside narratives whose emphasis and linguistic orientation vary. This manuscript examines how positive language in environmental, social, and governance reports conditions the association between ESG ratings and corporate profitability. The underlying study assembles 10,021 reports issued by Chinese listed companies during 2009–2021 and retains 9,321 firm-year observations after matching and sample restrictions. Positive tone is measured as the proportion of words classified as favorable within each report. Firm and year fixed-effects regressions relate return on equity to SINO ESG ratings, tone, and their interaction, with standard errors clustered by company and year. The baseline interaction is positive, with an estimate of 0.1259, whereas the separate tone coefficient is not statistically distinguishable from zero. The evidence is consistent with a stronger ESG–profitability association when reporting adopts a more positive orientation. Differences across information environments and investor categories suggest that the relationship is conditional: it is more apparent in several less transparent or closely scrutinized settings, among long-horizon institutional investors, and among companies without QFII participation. Alternative measures, matching, selection models, and supplementary specifications provide varying degrees of support. Cross-provider rating disagreement and some inconsistencies between narrative descriptions and reported estimates qualify the breadth of the conclusions. The findings support examining disclosure language jointly with quantitative sustainability assessments, while providing no basis for treating optimistic wording as an independent cause of profitability or equating QFII participation with all foreign ownership.

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1. INTRODUCTION

A sustainability assessment reaches financial stakeholders through more than a rating. Companies explain their environmental commitments, describe their relationships with employees and communities, and present governance arrangements through reports that combine measurements with interpretation. Even where two

companies receive similar ESG assessments, the language surrounding those assessments can differ substantially. One report may emphasize achievements and anticipated improvements, while another gives more prominence to operational challenges or unresolved risks. Such differences raise a question about the relationship between substantive assessments and the narratives through which stakeholders understand them: does the association between ESG ratings and corporate performance depend on how sustainability information is expressed?

The evidence considered here comes from Huang, Hu, Wang, and Wang's investigation of Chinese listed companies [1]. This rewritten manuscript reorganizes that published investigation and retains its reported data and estimates. The empirical material is attributed to the original authors rather than presented as a newly collected dataset or an independently replicated analysis. Its principal finding concerns an interaction: positive disclosure language is associated with a stronger relationship between ESG ratings and accounting profitability. That distinction matters because an interaction does not establish that positive language, considered separately, improves performance. It instead indicates that the relationship involving one observed characteristic changes with another characteristic within the fitted model.

Sustainability reporting provides a useful setting for examining this interpretive relationship. Research on mandatory reporting and corporate sustainability documents shows that nonfinancial disclosures can influence the information available to markets, although their usefulness depends on reporting incentives, credibility, and comparability [2]–[4]. The original study situates Chinese reporting within a setting in which companies retained substantial discretion over narrative presentation during the sample period. That discretion permits variation in tone but also creates uncertainty about what a favorable narrative signifies. Positive wording may communicate managerial confidence and strategic direction, or it may reflect a preference for presenting the company favorably. The same linguistic feature can therefore carry different meanings depending on the surrounding evidence.

The distinction between disclosure content and disclosure presentation is particularly consequential when rating providers disagree. ESG scores summarize heterogeneous practices using different coverage, definitions, and aggregation procedures [5]. An investor observing a favorable domestic rating may still face uncertainty about the activities behind it and their implications for future profitability. Narrative reporting may help contextualize the rating. Equally, language that is inconsistent with observable conduct may weaken confidence in the communication. A study of tone should consequently examine the relationship between language and quantitative information without assuming that optimistic expression necessarily represents superior sustainability performance.

Signaling theory provides the organizing perspective. A signal becomes useful through the information it conveys, the circumstances in which it is received, and the interpretation adopted by its audience [6], [7]. ESG ratings and narrative tone need not convey identical information. Ratings offer an organized assessment of observable sustainability characteristics, while tone expresses the relative prominence of favorable language within a report. When stakeholders have limited information, this narrative orientation may carry greater incremental weight. When independent information and analytical resources are abundant, the additional contribution of wording may be smaller. The argument is therefore conditional on both the company's information environment and the characteristics of the audience.

The original investigation follows this reasoning using an initial collection of 10,021 reports from 2009–2021 and a final panel of 9,321 firm-years. Its principal specification combines ESG ratings, positive tone, their interaction, company controls, and firm and year fixed effects. The estimates associate stronger ESG ratings with higher return on equity and identify a positive interaction between ratings and tone. Institutional ownership, investor horizons, sectoral characteristics, geography, and pollution classifications provide additional comparisons. These comparisons are informative about the settings in which the association appears, although they do not directly observe how individual investors read reports or translate their interpretations into trading and engagement decisions.

Several qualifications shape the contribution. The dependent variable in the main analysis is accounting profitability, which should not be treated as interchangeable with market valuation. The text measure represents the average orientation of an entire report, including standardized and compliance-related passages. The institutional classifications describe ownership configurations rather than directly measured cognitive responses. The analysis also relies primarily on the SINO rating system, whose agreement with other providers is limited. These features do not negate the evidence, but they determine the level at which a defensible conclusion can be stated.

The analysis connects narrative framing with quantitative ratings and examines their relationship across information environments and investor groups. The sections that follow explain the theoretical argument, empirical design, and results before assessing their implications and limits.

2. LITERATURE REVIEW

The association between sustainability activity and financial outcomes has been examined through several theoretical traditions. Stakeholder theory suggests that attention to employees, customers, communities, and other constituencies can sustain relationships important to organizational performance [8]. The resource-based view emphasizes capabilities and assets that competitors cannot easily reproduce [9]. Institutional theory directs attention to legitimacy and conformity within organizational fields [10]. These perspectives offer complementary explanations for why ESG-oriented practices may be associated with access to resources, reputational benefits, and durable stakeholder support. They do not require that every sustainability initiative produce immediate accounting gains or that a favorable rating fully captures the quality of those initiatives.

Quantitative syntheses generally provide a basis for expecting a positive relationship between social or sustainability performance and financial performance, while also documenting the importance of research setting and measurement [11], [12]. Firm risk and stakeholder trust provide additional mechanisms through which responsible conduct may matter [13], [14]. The relevance of such mechanisms varies with the economic environment and the materiality of particular activities. A firm's ESG assessment therefore supplies information about a broad set of practices rather than a mechanically determined forecast of its next profitability realization. This leaves room for communication to influence how the assessment is interpreted without requiring the communication itself to change the underlying activity.

Sustainability reporting extends this interpretive problem. Disclosures allow companies to describe objectives, explain trade-offs, and relate measured outcomes to an organizational strategy. Reviews of ESG research and reporting emphasize that information can affect financing and stakeholder judgments through multiple channels [2]–[4]. Yet narrative discretion complicates the distinction between informative explanation and selective presentation. Reporting can reduce uncertainty when it clarifies relevant evidence. It can also obscure uncertainty if achievements are emphasized while problems receive little attention. A favorable tone is consequently neither sufficient evidence of misleading disclosure nor sufficient evidence of credible commitment.

The corporate narrative literature treats tone as the directional orientation of language, usually operationalized through the prevalence of positive and negative expressions. Studies of earnings calls and other financial communications examine whether linguistic features convey information beyond reported financial quantities [15], [16]. Reviews of narrative disclosure identify both informational and strategic uses of tone [17]. Managerial optimism can influence communication, while reporting incentives and constraints may affect the extent to which that optimism reflects an informative assessment or discretionary presentation [18]. These considerations caution against treating the linguistic measure as a direct observation of managerial intention.

Tone should also be separated from other textual constructs. Readability concerns how difficult a passage is to process; complexity concerns the structure and demands of the communication; uncertainty concerns ambiguity or unresolved possibilities. Positive tone concerns the direction of the language. A document can be readable and pessimistic, or technically complex and strongly affirmative. Research measuring communication quality and ESG-related uncertainty therefore addresses neighboring rather than identical questions [19], [20]. Keeping these distinctions explicit is necessary when interpreting a word-frequency measure, because a positive-word ratio does not establish whether the report is comprehensible, complete, or substantively precise.

Signaling theory explains why the same narrative orientation may have different implications across information environments [6], [7]. Investors rarely observe every sustainability-related action directly. They instead combine corporate statements with ratings, financial reports, and other information. A favorable narrative may strengthen the interpretation of an ESG rating when it provides a coherent account of commitments and progress. Its incremental value may diminish when investors already possess detailed evidence or when the language is highly standardized. The relevant prediction concerns complementarity between the rating and the narrative, rather than an unconditional benefit from positive wording.

Rating disagreement makes this complementarity more difficult to interpret. Different agencies can assign divergent assessments to the same enterprise because they measure different activities, weight them differently, or use different information [5]. The source's comparison of SINO, Bloomberg, and MSCI illustrates this problem directly. A finding obtained with one provider cannot automatically be described as a relationship involving a universally agreed quantity called ESG performance. Domestic and international ratings may contain overlapping information while emphasizing different dimensions. Evidence on global and local ratings in China reinforces the importance of recognizing the particular measurement system used [21].

Impression management supplies a competing account. Companies can use narrative discretion to shape perceptions even where substantive activities change little [22]. Research on greenwashing examines the distance between environmental communication and underlying practice [23]. Evidence on corporate responsibility reports also considers whether readability and tone convey information relevant to investors [24]. Together, these literatures suggest that tone may complement a credible ESG signal or serve as a symbolic substitute for verifiable evidence. The empirical design must therefore distinguish an observed interaction from a demonstrated credibility mechanism. A positive coefficient is consistent with the signaling account, but does not by itself eliminate strategic presentation.

Information asymmetry provides a boundary condition. When stakeholders face greater uncertainty about a company's activities, qualitative cues may become more consequential. At the same time, uncertainty can make misleading narratives harder to detect. These possibilities coexist rather than cancel each other out. Sectoral reporting requirements, technological complexity, regional information infrastructure, and environmental scrutiny may affect the balance. The source treats nonfinancial and high-technology firms as settings where ESG activities can be harder to evaluate, while developed regions and polluting sectors may involve stronger external attention. These classifications supply indirect comparisons; they do not constitute direct measures of a single information-asymmetry mechanism.

Institutional ownership adds an audience-side perspective. Institutional investors can possess resources and experience that enable them to interpret sustainability information and evaluate climate-related risks [25]. A larger institutional presence may reduce the incremental value of broad narrative cues because more detailed analysis is available. This reasoning motivates the expectation that tone's moderating association becomes weaker as institutional ownership rises. However, institutional ownership is an organizational characteristic of the shareholder base, not a direct measure of information-processing quality. Institutions differ in objectives, constraints, expertise, and access to information. An aggregate ownership measure can therefore obscure substantial diversity.

Investment horizon is one such difference. Research on institutional investors distinguishes near-term earnings preferences from longer-term value considerations [26], [27]. Long-horizon investors may be more willing to consider sustainability narratives because many ESG-related outcomes develop gradually and cannot be assessed from current financial indicators alone. Responsible investment frameworks similarly connect ESG characteristics to portfolio objectives, risk, and investor preferences [28]. The source consequently expects a stronger tone-related association among companies grouped with long-term institutions. This prediction does not contradict the sophistication argument: analytical capability and investment horizon describe different dimensions of institutional behavior.

Foreign participation introduces another distinction, but the available classification requires precision. The study observes the Qualified Foreign Institutional Investor channel, whose participants operate under formal qualification and regulatory arrangements. It does not measure all foreign institutional ownership and does not incorporate firm-level Stock Connect holdings. The expectation of a weaker narrative association among QFII-participating firms rests on their potential reliance on standardized and internationally comparable information. Any conclusion must remain tied to that channel. Differences between QFII and non-QFII firms may also reflect company selection, investor composition, and changes over time, rather than a single stable preference for quantitative information.

These arguments lead to four connected expectations. Tone may condition the association between ESG ratings and corporate performance. That conditional association may be stronger where qualitative information is more consequential, weaker where aggregate investor sophistication reduces the value of narrative cues, stronger among long-horizon institutions, and weaker in the presence of QFII participation. The expectations concern observable differences in fitted relationships. They neither identify the intentions behind particular words nor establish that tone causes investors to change behavior. Their value lies in connecting narrative measurement with clearly bounded empirical comparisons.

The methodological literature on financial text further informs this approach. Dictionary methods provide transparent, scalable measures but depend on language and domain [29], [30]. A word considered favorable in a general-purpose lexicon may have a different role in financial or sustainability reporting. Research on Chinese financial dictionaries emphasizes this domain dependence [31]. The source's ESG-oriented lexicon responds to that problem, while comparisons with the National Taiwan University Semantic Dictionary assess whether the findings depend entirely on the customized word list. The absence of comparable non-ESG documents remains a distinct limitation: agreement across dictionaries cannot establish that the measured style is unique to sustainability communication.

3. METHODS

The empirical material covers Chinese listed companies over 2009–2021. ESG ratings are obtained from the SINO database, financial and governance variables from Wind and CSMAR, and reporting texts from CNINFO and company websites. The initial corpus contains 10,021 sustainability reports. Matching requirements and missing financial or governance controls remove 377 observations. Excluding companies represented by only one annual report removes a further 323 observations, leaving 9,321 firm-years. The second restriction supports estimation using within-company variation. All continuous variables are winsorized at the first and ninety-ninth percentiles. These procedures are those reported by the source; the rewritten presentation does not imply that the underlying licensed databases have been independently reconstructed.

Return on equity is the principal outcome and is defined as net profit divided by average shareholders' equity. Return on assets and Tobin's Q appear in supplementary specifications. These alternatives examine

different dimensions of firm performance, so their coefficients are not interchangeable in scale or economic interpretation. SINO assessments run from C to AAA and are assigned numerical values from one to nine, with higher values representing stronger ESG evaluations. Bloomberg and MSCI measures are introduced to examine provider comparability and alternative specifications. The results remain linked to the rating definitions and sample coverage available in each analysis.

Positive tone, denoted PosTone, is the proportion of positive words in a report's total token count. Text preparation removes irrelevant material, standardizes character representation, eliminates special symbols, segments Chinese text, and removes stop words. The Harbin Institute of Technology stop-word list is supplemented with recurring report-template expressions, and numerical expressions receive a common placeholder. The resulting measure captures document-wide narrative orientation. It is not a sentence-level assessment of emotion and does not establish whether positive statements are factual, prospective, conditional, or rhetorical. Tables, standardized passages, and compliance sections remain relevant to the interpretation of a full-document measure.

The source develops an ESG-oriented Chinese lexicon and compares it with NTUSD-based measures. NetTone represents the difference between positive and negative language, while PosTone2 and NetTone2 provide alternative dictionary measures. Horse-race specifications include the customized and benchmark measures together. A temporal exercise estimates lexicon weights from the 2010–2019 corpus and freezes them before applying the resulting measure to later reports. This design limits the possibility that the reported association depends entirely on recalibrating the lexicon using later observations. It does not substitute for testing the measure against independently annotated statements about substantive ESG practices.

The control set comprises asset growth, company size, age, fixed-asset intensity, leverage, state ownership, and top-management remuneration. Growth is the annual change in total assets divided by previous-period assets. Size is the natural logarithm of total assets, and Age is the natural logarithm of company age. FAP is fixed assets divided by total assets; Debt is total liabilities divided by total assets. Pn measures state-held shares relative to total share capital. TMTPay is the natural logarithm of total executive compensation. The source's model description emphasizes several of these controls while its variable table additionally reports Growth; the original reported specifications and their control indicators are retained without inventing undisclosed coefficient estimates.

Institutional ownership is the shareholding proportion held by institutions. The methods description places companies above and below the sample mean, whereas the results description refers to a median division. Because those descriptions differ, the precise binary threshold requires clarification from the original implementation. The high- and low-ownership estimates are preserved as published rather than reassigned. Continuous institutional ownership is described as a supplementary approach, but the displayed tables do not provide a complete set of corresponding estimates. Investor-horizon groups follow the source's institutional categories: long-horizon institutions include social security funds, insurers, financial firms, and banks, whereas securities firms and some mutual funds enter the short-horizon category.

QFII participation defines a separate comparison. Companies with and without observed participation are analyzed independently. This classification captures a regulated channel of foreign investment and excludes unobserved Stock Connect ownership. Post2018 equals one from 2018 onward and zero beforehand. Its use describes a temporal comparison rather than a firm-specific treatment assignment. Consequently, neither the QFII classification nor the post-period interaction identifies the consequences of all foreign investment or isolates a single regulatory reform.

The main equation expresses ROE as a function of ESG, PosTone, ESG multiplied by PosTone, the control vector, firm effects, year effects, and an error term. In symbolic form, $ROE_{it} = \alpha + \beta1\ ESG_{it} + \beta2\ PosTone_{it} + \beta3\ ESG_{it}\ PosTone_{it} + \gamma X_{it}$ + firm effects + year effects + ε_{it}. The interaction coefficient β3 indicates how the conditional ESG–ROE slope changes with tone. The ESG coefficient β1 describes the fitted slope at zero tone unless variables are centered, and the tone coefficient describes the fitted tone association at zero ESG. These reference points should not be confused with unconditional average effects across the observed sample.

Firm fixed effects absorb time-invariant company characteristics, and year effects absorb common annual influences. The source clusters standard errors by company and year and uses the approach associated with cluster-robust inference [32]. It reports a correction where the covariance matrix is not positive semidefinite. Thirteen year clusters imply a reference t distribution with twelve degrees of freedom; the training-period exercise instead uses ten degrees of freedom for eleven annual clusters. Firm-only clustering is also reported, with 1,167 firm clusters and 1,166 degrees of freedom. The limited number of annual clusters remains relevant to the precision of subgroup comparisons.

Supplementary designs address different concerns. Errors-in-variables estimates examine rating measurement; alternative outcomes and dictionaries examine specification sensitivity; a Heckman procedure models disclosure selection; and propensity-score matching compares three matched-sample constructions. The selection first stage uses a Probit disclosure model with cost of equity capital as the exclusion variable, referring

to the valuation framework in [33]. Coefficient-stability calculations follow Oster [34]. Lagged-tone models, future-tone and future-outcome placebos, firm-specific dynamics, and industry-by-year effects examine temporal alternatives. None of these designs supplies random assignment of disclosure tone, and their interpretation depends on the assumptions appropriate to each procedure.

The source's data-availability statement identifies a public repository for its ESG lexicon, stop-word list, tokenizer dictionary, and Python preprocessing scripts at doi:10.6084/m9.figshare.33019025. It states that Stata code and permitted replication materials were supplied confidentially to the journal. Wind and CSMAR data remain subject to licensing restrictions, and the report corpus is not redistributed. The original authors acknowledge support from National Natural Science Foundation grants 71974201 and 72002140 and National Social Science Foundation project 22&ZD145, and report no competing interests. Those statements describe the underlying publication and do not imply that new funding or replication activity accompanies this rewritten manuscript.

4. RESULTS

The five tables consolidate the source's numerical evidence into ordered panels. Each panel states the sequence in which estimates or summary statistics should be read. Semicolons separate values across that sequence, and the parenthetical line supplies the corresponding reported test statistics or standard errors. This presentation retains the published estimates, sample sizes, and supplementary results while avoiding a selective emphasis on significant findings. The tables preserve significance markings as printed; where those markings or narrative accounts require qualification, the accompanying interpretation makes that limitation explicit.

Table 1 brings together the descriptive moments, pairwise correlations, annual distributions, reporting coverage, sectoral composition, and persistence of tone. The sequence begins with the final-sample variables and then moves through the original descriptive supplements. This arrangement allows readers to assess both the cross-sectional information used in the regressions and the time variation available to the fixed-effects estimator. Reporting percentages and size-decile counts are retained as published, including patterns that warrant clarification before they are used as evidence about disclosure selection.

Table 1. Sample distributions reporting coverage and temporal variation

Measure or record	Reported values in the panel order
A Descriptive moments and lower triangular correlations. Values follow N, mean, SD, then correlations with variables 1–11: ESG, ROE, PosTone, InsInvestor, Growth, Size, Age, FAP, Debt, Pn, TMTPay.	
(1) ESG	9321; 4.7625; 1.0079; 1.0000
(2) ROE	9321; 0.0913; 0.1077; 0.1585***; 1.0000
(3) PosTone	9321; 0.0492; 0.0149; −0.0113; −0.0510***; 1.0000
(4) InsInvestor	9321; 56.3225; 22.5727; 0.0646***; 0.1639***; −0.1210***; 1.0000
(5) Growth	9321; 0.2747; 4.5101; −0.0379***; 0.0634***; −0.0096; 0.0209**; 1.0000
(6) Size	9321; 23.4955; 1.7652; 0.1642***; 0.1119***; −0.1946***; 0.4599***; 0.0048; 1.0000
(7) Age	9321; 2.9237; 0.3498; 0.0321***; −0.0669***; 0.0457***; −0.0276***; −0.0026; 0.1510***; 1.000
(8) FAP	9321; 0.2163; 0.1863; −0.1107***; −0.1262***; 0.0625***; 0.0792***; −0.0181*; −0.1141***; −0.0785***; 1.0000
(9) Debt	9321; 0.5092; 0.2087; 0.0367***; −0.0880***; −0.1358***; 0.2366**; 0.0155; 0.6236***; 0.1169***; −0.1077***; 1.0000
(10) Pn	9321; 0.0537; 0.1414; −0.0188*; 0.0316***; −0.0389***; 0.2724***; 0.0170*; 0.0976***; −0.1583***; 0.0263**; 0.0822***; 1.0000
(11) TMTPay	9321; 14.8571; 0.8061; 0.1451***; 0.2409***; −0.1072***; 0.1367***; −0.0049; 0.4680***; 0.2467***; −0.2715***; 0.2215***; −0.0685***; 1.0000
B Annual size and reporting coverage. Values follow N, mean log assets, SD, disclosure rate.	
2009	369; 22.9153; 1.7185; 21.83%
2010	446; 23.1139; 1.7297; 21.88%
2011	532; 23.1081; 1.7633; 22.97%
2012	584; 23.1486; 1.7754; 23.64%
2013	623; 23.2391; 1.7302; 25.24%
2014	644; 23.3247; 1.7416; 24.86%
2015	684; 23.4111; 1.7384; 24.36%
2016	734; 23.5359; 1.7167; 24.21%
2017	795; 23.608; 1.7433; 22.93%
2018	894; 23.6248; 1.7321; 25.08%
2019	959; 23.7031; 1.7575; 25.53%
2020	1031; 23.7809; 1.7685; 24.70%
2021	1026; 23.8785; 1.7448; 21.93%
Total	9321; 23.4955; 1.7652
C Disclosure by size decile. Each year lists D1–D10; the second line gives the corresponding percentages.	
2009	36/169; 37/169; 37/169; 37/169; 37/169; 37/169; 37/169; 37/169; 37/169; 37/169 (21.30%); (21.89%); (21.89%); (21.89%); (21.89%); (21.89%); (21.89%); (21.89%); (21.89%); (21.89%)

2010	44/204; 45/204; 44/204; 45/203; 45/204; 44/204; 45/203; 44/204; 45/204; 45/204 (21.57%); (22.06%); (21.57%); (22.17%); (22.06%); (21.57%); (22.17%); (21.57%); (22.06%); (22.06%)
2011	53/232; 53/231; 53/232; 53/231; 54/232; 53/231; 53/232; 53/231; 53/232; 54/232 (22.84%); (22.94%); (22.84%); (22.94%); (23.28%); (22.94%); (22.84%); (22.94%); (22.84%); (23.28%)
2012	58/247; 58/247; 59/247; 58/247; 59/247; 58/247; 58/247; 59/247; 58/247; 59/247 (23.48%); (23.48%); (23.89%); (23.48%); (23.89%); (23.48%); (23.48%); (23.89%); (23.48%); (23.89%)
2013	62/247; 62/247; 62/247; 63/246; 62/247; 62/247; 63/246; 62/247; 62/247; 63/247 (25.10%); (25.10%); (25.10%); (25.61%); (25.10%); (25.10%); (25.61%); (25.10%); (25.10%); (25.51%)
2014	64/259; 64/259; 65/259; 64/259; 65/259; 64/259; 64/259; 65/259; 64/259; 65/260 (24.71%); (24.71%); (25.10%); (24.71%); (25.10%); (24.71%); (24.71%); (25.10%); (24.71%); (25.00%)
2015	68/281; 68/281; 69/281; 68/280; 69/281; 68/281; 68/280; 69/281; 68/281; 69/281 (24.20%); (24.20%); (24.56%); (24.29%); (24.56%); (24.20%); (24.29%); (24.56%); (24.20%); (24.56%)
2016	73/304; 73/303; 74/303; 73/303; 74/303; 73/303; 73/303; 74/303; 73/303; 74/304 (24.01%); (24.09%); (24.42%); (24.09%); (24.42%); (24.09%); (24.09%); (24.42%); (24.09%); (24.34%)
2017	79/347; 80/347; 79/346; 80/347; 79/346; 80/347; 79/347; 80/346; 79/347; 80/347 (22.77%); (23.05%); (22.83%); (23.05%); (22.83%); (23.05%); (22.77%); (23.12%); (22.77%); (23.05%)
2018	89/357; 89/356; 90/357; 89/356; 90/356; 89/357; 89/356; 90/357; 89/356; 90/357 (24.93%); (25.00%); (25.21%); (25.00%); (25.28%); (24.93%); (25.00%); (25.21%); (25.00%); (25.21%)
2019	95/376; 96/375; 96/376; 96/375; 96/376; 96/375; 96/376; 96/375; 96/376; 96/376 (25.27%); (25.60%); (25.53%); (25.60%); (25.53%); (25.60%); (25.53%); (25.60%); (25.53%); (25.53%)
2020	103/418; 103/417; 103/417; 103/418; 103/417; 103/417; 103/418; 103/417; 103/417; 104/418 (24.64%); (24.70%); (24.70%); (24.64%); (24.70%); (24.70%); (24.64%); (24.70%); (24.70%); (24.88%)
2021	102/468; 103/468; 102/468; 103/468; 103/467; 102/468; 103/468; 102/468; 103/468; 103/468 (21.79%); (22.01%); (21.79%); (22.01%); (22.06%); (21.79%); (22.01%); (21.79%); (22.01%); (22.01%)
D Industry distribution. Values follow company count and reported percentage.	
Computer, Communication, and Other Electronic Equipment Manufacturing	121; 8.12%
Pharmaceutical Manufacturing	92; 6.17%
Chemical Raw Materials and Chemical Products Manufacturing	84; 5.64%
Electrical Machinery and Equipment Manufacturing	73; 4.9%
Specialized Equipment Manufacturing	70; 4.7%
Software and Information Technology Services	69; 4.63%
Real Estate Industry	52; 3.49%
Capital Market Services	49; 3.29%
Electricity, Heat Production, and Supply Industry	44; 2.95%
Automobile Manufacturing	37; 2.48%
Non-metallic Mineral Products Manufacturing	36; 2.42%
E Annual ESG distribution. Values follow mean, SD, p25, median, p75, N.	
2009	4.7290; 0.7642; 4; 5; 5; 369
2010	4.5269; 0.8254; 4; 5; 5; 446
2011	4.8252; 0.8644; 4; 5; 5; 532
2012	4.8647; 0.8905; 4; 5; 5; 584
2013	4.7833; 0.8801; 4; 5; 5; 623
2014	4.6739; 0.9395; 4; 5; 5; 644
2015	4.5731; 0.9507; 4; 5; 5; 684
2016	4.6063; 1.0069; 4; 5; 5; 734
2017	4.7459; 1.0191; 4; 5; 5; 795
2018	4.7919; 1.0631; 4; 5; 6; 894
2019	4.7925; 1.1843; 4; 5; 6; 959
2020	4.8846; 1.1092; 4; 5; 6; 1031
2021	4.9035; 1.0441; 4; 5; 6; 1026
Total	4.7625; 1.0079; 4; 5; 5; 9321
F Annual positive tone. Values follow mean, SD, p25, median, p75.	
2009	0.0495; 0.0082; 0.0448; 0.0503; 0.0548
2010	0.0494; 0.0084; 0.0439; 0.0498; 0.0552
2011	0.0492; 0.0084; 0.0438; 0.0498; 0.0551
2012	0.0480; 0.0081; 0.0425; 0.0486; 0.0538
2013	0.0477; 0.0081; 0.0424; 0.0481; 0.0535
2014	0.0473; 0.0082; 0.0419; 0.0477; 0.0528
2015	0.0471; 0.0080; 0.0418; 0.0475; 0.0527
2016	0.0466; 0.0078; 0.0418; 0.0464; 0.0517
2017	0.0457; 0.0082; 0.0407; 0.0460; 0.0514
2018	0.0455; 0.0079; 0.0403; 0.0453; 0.0508
2019	0.0446; 0.0079; 0.0401; 0.0446; 0.0494

	2020	0.0698; 0.0309; 0.0434; 0.0600; 0.0900
	2021	0.0445; 0.0092; 0.0399; 0.0442; 0.0489
	Total	0.0492; 0.0149; 0.0416; 0.0471; 0.0532
	G Interyear tone correlations. Each year lists correlations with 2009 through the indicated year.	
	2009	1.00
	2010	0.73; 1.00
	2011	0.69; 0.82; 1.00
	2012	0.62; 0.72; 0.83; 1.00
	2013	0.63; 0.68; 0.72; 0.78; 1.00
	2014	0.58; 0.67; 0.74; 0.79; 0.86; 1.00
	2015	0.48; 0.60; 0.64; 0.63; 0.75; 0.82; 1.00
	2016	0.50; 0.57; 0.58; 0.58; 0.66; 0.72; 0.76; 1.00
	2017	0.46; 0.55; 0.53; 0.54; 0.64; 0.63; 0.68; 0.83; 1.00
	2018	0.39; 0.48; 0.48; 0.48; 0.59; 0.57; 0.59; 0.76; 0.81; 1.00
	2019	0.41; 0.47; 0.48; 0.49; 0.59; 0.55; 0.56; 0.73; 0.76; 0.85; 1.00
	2020	0.16; 0.18; 0.19; 0.22; 0.24; 0.17; 0.19; 0.24; 0.23; 0.26; 0.26; 1.00
	2021	0.34; 0.38; 0.44; 0.42; 0.51; 0.49; 0.49; 0.57; 0.58; 0.64; 0.67; 0.27; 1.00
	H Analysis sample sizes after the indicated additional availability restriction.	
	Baseline	9321
	Institutional ownership available	9196
	Horizon classification available	9070
	QFII classification available	9053
	Bloomberg ratings available	8110
	Alternative tone available	6889
	Cost of equity available	5257
	Selection outcome sample	4958
	Matching sample sizes	6854; 8350; 9308 (nearest neighbor 1 to 1; nearest neighbor 1 to 3; kernel common support)

The average ESG score is 4.7625, average ROE is 0.0913, and average PosTone is 0.0492. The standard deviation of tone is 0.0149; its reported between-company and within-company standard deviations are 0.0098 and 0.0122. Within-company variation therefore remains available after absorbing firm effects. ESG correlates positively with ROE at 0.1585, while tone correlates negatively with ROE at −0.0510 and only weakly with ESG at −0.0113. These unconditional relationships differ from the conditional interaction tested subsequently. The maximum and mean variance-inflation factors are 2.11 and 1.31, respectively, offering little indication of severe collinearity in the reported explanatory set.

Annual coverage rises from 369 observations in 2009 to 1,031 in 2020 before reaching 1,026 in 2021. ESG averages increase from 4.7290 to 4.9035 across the endpoints, but tone does not follow a monotonic increase. Its mean reaches 0.0698 in 2020 and returns to 0.0445 in 2021. Tone correlations involving 2020 are lower than many adjacent-year relationships, suggesting an unusual annual composition or communication environment. The word-frequency plot shows rising negative-word counts and a positive-word peak in 2020 followed by a decline, without tabulating exact counts. The industry distribution lists selected sectors. The almost uniform reporting percentages across size deciles should be interpreted cautiously because the published table does not fully explain the construction producing that pattern.

Table 2 assembles the baseline estimates and investor comparisons. The first panel separates the addition of controls, tone, and the interaction, making clear that a positive moderation estimate is different from a significant standalone tone coefficient. The later panels distinguish investor horizon from QFII participation and retain the temporal sensitivity of the QFII comparison. These are separate dimensions of ownership and should not be compressed into a single ranking of investor sophistication.

Table 2. Baseline moderation and institutional investor comparisons

	Measure or record	Reported values in the panel order
	A Baseline and institutional ownership. Model order: ESG only; controls; tone; interaction; high ownership; low ownership. Parentheses are t statistics.	
	ESG	0.0074***; 0.0045*; 0.0045*; 0.0045*; 0.0026; 0.0041 (2.7531); (1.7925); (1.7931); (1.8862); (1.0586); (1.5469)
	PosTone	—; —; 0.0065; −0.0206; −0.0166; −0.1321 —; —; (0.1032); (−0.3122); (−0.1740); (−1.5268)
	ESG × PosTone	—; —; —; 0.1259**; 0.0694; 0.1593** —; —; —; (2.5442); (1.1472); (2.4197)
	Constant	0.0559***; −0.7788***; −0.7793***; −0.7544***; −0.8921***; −0.6637** (4.3908); (−3.9771); (−3.9778); (−3.8778); (−3.2462); (−2.5435)
	Controls	NO; YES; YES; YES; YES; YES
	Year effects	YES; YES; YES; YES; YES; YES
	Firm effects	YES; YES; YES; YES; YES; YES
	Observations	9321; 9321; 9321; 9321; 5147; 4049
	Adjusted R^2	0.3551; 0.4050; 0.4049; 0.4052; 0.4502; 0.3870

B Investor types. Model order: long horizon, short horizon, QFII, non-QFII. Parentheses are t statistics.				
ESG	0.0005;	0.0070**;	0.0003;	0.0014
	(0.2480); (2.0874); (0.1734); (1.5237)			
PosTone	−0.0533;	−0.0812;	0.0630;	−0.0443
	(−0.5403); (−1.0628); (0.4459); (−1.4414)			
ESG × PosTone	0.2023***;	0.0864;	0.0459;	0.0546**
	(3.6787); (1.3257); (0.6173); (2.2066)			
Constant	−0.4578*;	−0.9601***;	−0.1761;	−0.2439***
	(−1.7239); (−3.2249); (−0.9441); (−3.0916)			
Controls	YES; YES; YES; YES			
Year effects	YES; YES; YES; YES			
Firm effects	YES; YES; YES; YES			
Observations	4912; 4158; 1190; 7863			
Adjusted R^2	0.4320; 0.4201; 0.6314; 0.5564			
C QFII period sensitivity. Model order: non-QFII, QFII. Post2018 indicates 2018 onward. Parentheses are t statistics.				
ESG	0.0001;			0.0002
	(0.0572); (0.0365)			
PosTone	−0.6188;			−0.0750
	(−1.6185); (−0.0867)			
ESG×PosTone	0.0266;			−0.6308*
	(0.0972); (−1.9322)			
post2018×ESG	0.0092**;			0.0020
	(2.7880); (0.2629)			
post2018×PosTone	0.6531;			0.0773
	(1.6238); (0.0870)			
post2018×ESG×PosTone	0.0292;			0.9630**
	(0.1077); (2.6379)			
Constant	−0.8586***;			−0.3847
	(−4.2215); (−0.9796)			
Controls	YES; YES			
Year effects	YES; YES			
Firm effects	YES; YES			
Observations	7863; 1190			
Adjusted R^2	0.399; 0.476			

The ESG-only estimate is 0.0074, corresponding to a reported 0.74-percentage-point difference in ROE per rating point. With controls, the ESG coefficient is 0.0045. Introducing tone alone yields an estimate of 0.0065 with a t statistic of 0.1032. The interaction specification reports ESG multiplied by PosTone at 0.1259, with a t statistic of 2.5442 and a two-star significance marking. The source describes a one-standard-deviation increase in tone as increasing the estimated ESG–ROE slope by approximately 41.13 percent. That reported comparison depends on the reference slope and rounding; it should not be read as a percentage increase in ROE itself. The plotted marginal relationship is described as near zero around tone of 0.05, but its centering and plotted quantity require clarification alongside the displayed coefficients.

The ownership split reports interactions of 0.0694 for the high-ownership group and 0.1593 for the low-ownership group, with significance indicated only for the latter. The source also reports a Chow statistic of 23.93, with p below 0.001, for the ESG-coefficient comparison. Horizon-group interactions are 0.2023 and 0.0864 for long- and short-horizon groups; the corresponding Chow statistic is 20.99, with p below 0.001. In the tabulated QFII comparison, interactions are 0.0459 and 0.0546, with significance marked only for non-QFII firms. The original prose instead gives 0.1127 and 0.0981. The table values are retained here and the conflicting prose values are disclosed rather than substituted. The QFII Chow statistic is 7.92, with p below 0.01. Period sensitivity further shows a QFII triple interaction of 0.9630, indicating that the comparison is not constant over time.

Table 3 examines the information environment using the original sectoral, regional, and pollution classifications, followed by the alternative-measure comparisons. Displaying the two sets together permits a more discriminating assessment of robustness than a general statement that every subgroup finding survives. Each panel uses the same ordering of ten groups, although missing classifications and measurement availability produce different sample sizes. Statistical significance within one group and its absence within another should be distinguished from the separately reported tests of coefficient differences.

Table 3. Sectoral regional and pollution comparisons under alternative measures

Measure or record	Reported values in the panel order
A Main subgroup analysis. Model order: financial, nonfinancial, high technology, other technology, East, West, Middle, Northeast, polluting, nonpolluting. Parentheses are t statistics.	
ESG	0.0050; 0.0034; 0.0041; 0.0036; 0.0054*; −0.0014; −0.0004; 0.0108; −0.0036; 0.0073***
	(1.1059); (1.4512); (1.5058); (1.3839); (1.8795); (−0.3069); (−0.2167); (1.5229); (−1.2028); (2.7888)
PosTone	−0.4533***; −0.0415; 0.0064; −0.1126; −0.0262; −0.2447; 0.2591; −0.5647; −0.0225; −0.0173
	(−3.1537); (−0.5652); (0.0571); (−1.0835); (−0.2523); (−0.6492); (1.6262); (−1.0704); (−0.1295); (−0.2274)
ESG × PosTone	0.1334; 0.1455**; 0.1220*; 0.1495; 0.1399*; 0.2173; 0.1176; 0.4351; 0.2358*; 0.0880
	(1.4930); (2.3431); (1.6550); (1.5321); (1.7078); (1.2199); (0.7144); (1.0611); (1.7569); (1.5084)

	Constant	−0.4745; −0.5920***; −0.3922*; −0.8433***; −0.6076**; −0.7694*; −0.7383; −2.3737***; −1.0176***; −0.6542*** (−0.5530); (−2.9457); (−1.7891); (−2.7881); (−2.5090); (−1.7469); (−1.3245); (−3.0841); (−2.8332); (−3.1327)
	Controls	YES; YES; YES; YES; YES; YES; YES; YES; YES; YES
	Year effects	YES; YES; YES; YES; YES; YES; YES; YES; YES; YES
	Firm effects	YES; YES; YES; YES; YES; YES; YES; YES; YES; YES
	Observations	675; 7432; 3583; 4512; 5561; 1135; 1070; 341; 2380; 6931
	Adjusted R^2	0.5630; 0.4138; 0.4536; 0.4090; 0.4154; 0.4614; 0.4054; 0.4679; 0.4048; 0.4451
	B Alternative measures across the same ten subgroups. Bloomberg ESG and PosTone2 replace baseline measures. Parentheses are t statistics.	
	Bloomberg ESG	−0.0015; −0.0007; −0.0014; −0.0007; −0.0007; −0.0003; −0.0029; −0.0072**; −0.0022; −0.0011 (−0.9638); (−1.0476); (−1.3565); (−0.8961); (−0.9887); (−0.1846); (−1.2270); (−2.3906); (−1.6233); (−1.5459)
	PosTone2	−0.0059; −0.0061*; −0.0116**; −0.0041; −0.0061; −0.0026; −0.0133; −0.0342**; −0.0103; −0.0082** (−0.7343); (−1.7181); (−2.1333); (−1.0372); (−1.5860); (−0.2797); (−1.1897); (−2.4728); (−1.4741); (−2.2424)
	BloombergESG × PosTone2	0.0002; 0.0002*; 0.0003**; 0.0002; 0.0002*; 0.0001; 0.0005; 0.0012***; 0.0003*; 0.0002** (1.1616); (1.9505); (2.0676); (1.5732); (1.8987); (0.5393); (1.4258); (2.8629); (1.6803); (2.4775)
	Constant	0.2166*; −0.1151**; 0.0862; −0.3139***; −0.1110*; −0.3343**; 0.1052; −0.2626; −0.4042***; −0.0436 (1.8313); (−2.1291); (1.0234); (−5.0665); (−1.8534); (−2.4971); (0.5840); (−1.0547); (−3.6229); (−0.7820)
	Controls	YES; YES; YES; YES; YES; YES; YES; YES; YES; YES
	Year effects	YES; YES; YES; YES; YES; YES; YES; YES; YES; YES
	Firm effects	YES; YES; YES; YES; YES; YES; YES; YES; YES; YES
	Observations	574; 6309; 3085; 3787; 4728; 967; 887; 304; 1733; 5147
	Adjusted R^2	0.5642; 0.5851; 0.603; 0.588; 0.5679; 0.7024; 0.5733; 0.6884; 0.5564; 0.6189

The main interaction is 0.1334 for financial companies and 0.1455 for nonfinancial companies, with significance marked only in the latter. High-technology companies have an interaction of 0.1220, compared with 0.1495 elsewhere; only the former receives a ten-percent significance marking in the main table. Regional interactions are 0.1399 in the East, 0.2173 in the West, 0.1176 in the Middle, and 0.4351 in the Northeast. The East estimate alone is marked significant. Polluting firms have an interaction of 0.2358, compared with 0.0880 for other firms. Reported Chow statistics are 7.86 for finance, 13.44 for technology, 12.41 for region, and 20.67 for pollution, each with p below 0.01.

These patterns are consistent with contextual variation but do not identify information asymmetry directly. Regional differences can reflect disclosure quality, information intermediaries, and stakeholder demand simultaneously. The alternative-measure panel also contains important differences: its high-technology interaction is significant, while the other-technology estimate is not; both pollution groups receive significance markings; and the Northeast interaction is strongly marked. These numerical results do not fully support the original prose description of a uniformly stronger association among non-high-technology firms. They support a more qualified conclusion that the estimated moderation depends on context and measurement, with some subgroup rankings changing across specifications.

Table 4 consolidates rating comparability, alternative measures, disclosure-selection correction, matching, coefficient stability, and post-2018 specifications. The panels address different threats to interpretation and should not be treated as repetitions of one test. Cross-provider comparisons concern measurement, while matching and selection models concern the composition of observed companies. The table retains their different sample sizes and uncertainty measures so that an apparently stable sign is not mistaken for identical evidence across designs.

Table 4. Rating measurement alternative specifications and selection sensitivity

	Measure or record	Reported values in the panel order
	A Cross provider correlations. Values follow SINO, MSCI, Bloomberg.	
	ESG	1.000; —; —
	MSCI	0.096***; 1.000; —
	Bloomberg ESG	0.147***; 0.634***; 1.000
	B Rating coverage. Values follow firm years and percentage.	
	Only SINO	1161; 12.5%
	Only Bloomberg	0; 0
	Only MSCI	0; 0
	SINO & Bloomberg (no MSCI)	6352; 68.1%
	SINO & MSCI (no Bloomberg)	34; 0.4%
	Bloomberg & MSCI (no SINO)	0; 0
	All three	1774; 19.0%
	Total (at least one source)	9321; 100%
	C Errors in variables. Model order: uncorrected, corrected. Parentheses are standard errors.	
	ESG	0.1977***; 0.1178*** (0.0399); (0.0390)

Controls	YES; YES		
Firm effects	YES; YES		
Year effects	YES; YES		
N	9321; 9321		
Reliability rho²	-; 0.243		
D Alternative outcomes and Bloomberg ratings. Outcomes: ROA, Tobin Q. Parentheses are t statistics.			
Bloomberg ESG	0.0005***; (3.1479); (1.8189)		0.0113*
Constant	−0.1603**; (−2.0068); (2.8569)		10.1588***
Controls	YES; YES		
Year effects	YES; YES		
Firm effects	YES; YES		
Observations	8110; 8110		
Adjusted R²	0.5840; 0.6560		
E Alternative tone. Models: net tone ROE; net tone ROA; Bloomberg plus PosTone2 ROA. Parentheses are t statistics.			
ESG	0.0010; (0.3582); (−0.6190); —	−0.0007;	—
NetTone	−0.3534**; (−1.9670); (−2.3611); —	−0.2108***;	—
ESG × NetTone	0.0823***; (2.5709); (2.8282); —	0.0442***;	—
Bloomberg ESG	—; —; —; (−1.2106)	—;	−0.0011
PosTone2	—; —; —; (−1.5376)	—;	−0.0081
Bloomberg ESG × PosTone2	—; —; —; (1.8736)	—;	0.0003*
Constant	−0.7623***; (−3.9270); (−2.6458); (−1.0534)	−0.2031***;	−0.0978
Controls	YES; YES; YES		
Year effects	YES; YES; YES		
Firm effects	YES; YES; YES		
Observations	9321; 9321; 6889		
Adjusted R²	0.4051; 0.5665; 0.5881		
F Disclosure selection first stage. Probit. Parentheses are standard errors.			
CEC	−0.2155 (0.5323)		
Controls	YES		
Constant	0.9820 (0.9392)		
Log pseudolikelihood	−2994.7883		
Observations	5257		
Pseudo R²	0.0971		
G Disclosure selection outcome. Parentheses are standard errors.			
ESG	−0.0015** (0.0006)		
PosTone	−0.0145 (0.0328)		
ESG × PosTone	0.0461* (0.0253)		
IMR	−0.0385 (0.0348)		
Constant	−0.2883*** (0.0868)		
Controls	YES		
Year effects	YES		
Firm effects	YES		
Observations	4958		
Adjusted R²	0.875		
H Matched samples. Models: nearest neighbor 1 to 1; nearest neighbor 1 to 3; kernel. Parentheses are t statistics.			
ESG	0.0043*; (1.7452); (1.8565); (1.8677)	0.0045*;	0.0045*
PosTone	−0.1268; (−1.4277); (0.0719); (−0.1502)	0.0060;	−0.0115
ESG × PosTone	0.2058***; (3.8033); (3.1379); (2.7226)	0.1724***;	0.1468***
Constant	YES; YES; YES		
Controls	YES; YES; YES		
Year effects	YES; YES; YES		
Firm effects	YES; YES; YES		
Observations	6854; 8350; 9308		

Adjusted R²	0.4278; 0.4204; 0.4084			
I Coefficient stability. Values follow restricted, full, attenuation, delta. Parenthetical rows give restricted and full model t statistics.				
ESG	0.0074***; (2.8713); (2.1443); —; —	0.0052**;	−30.4%;	7.92
PosTone	−0.0748; (−0.9723); (−0.8828); —; —	−0.0564;	−24.6%;	10.56
ESG × PosTone	0.1502***; (2.8060); (2.6847); —; —	0.1322***;	−12.0%;	25.29
Constant	YES; YES; —; —			
Controls	NO; YES; —; —			
Year effects	YES; YES; —; —			
Firm effects	YES; YES; —; —			
Adjusted R²	0.3554; 0.3891; —; —			
J Post2018 controls. Models: positive tone ROE; net tone ROE; Bloomberg and PosTone2 ROA. Parentheses are t statistics.				
Post2018	0.0544***; (4.1056); (4.1040); (3.9768)	0.0544***;		0.0214***
ESG	0.0038; (1.6331); (0.2873); —	0.0008;		—
PosTone	−0.0163; (−0.2426); —; —	—;		—
ESG × PosTone	0.1131**; (2.3022); —; —	—;		—
NetTone	—; —; (−1.6527); —	−0.2990*;		—
ESG × NetTone	—; —; (2.2508); —	0.0701**;		—
Bloomberg ESG	—; —; —; (−1.4695)	—;		−0.0014
PosTone2	—; —; —; (−1.6669)	—;		−0.0087*
Bloomberg ESG × PosTone2	—; —; —; (2.0027)	—;		0.0003**
Constant	−0.8148***; (−4.3516); (−4.3716); (−1.3574)	−0.8176***;		−0.1220
Controls	YES; YES; YES			
Year effects	YES; YES; YES			
Firm effects	YES; YES; YES			
Observations	9321; 9321; 6889			
Adjusted R²	0.4157; 0.4157; 0.5940			

SINO correlates with Bloomberg at 0.147 and with MSCI at 0.096, while Bloomberg and MSCI correlate at 0.634. Coverage is concentrated in SINO and Bloomberg: 6,352 observations have both without MSCI, 1,774 have all three, 34 have SINO and MSCI without Bloomberg, and 1,161 have SINO alone. The errors-in-variables exercise reports an uncorrected coefficient of 0.1977 and an adjusted estimate of 0.1178, with reliability information reported as 0.243. The reduction should not be described as an automatic correction of simple classical attenuation without further information about the implemented measurement model. It nevertheless leaves a positive reported relationship within that exercise.

Alternative net-tone interactions are 0.0823 for ROE and 0.0442 for ROA. The Bloomberg–PosTone2 interaction in the alternative ROA model is 0.0003. The disclosure-selection outcome model reports an interaction of 0.0461 and an inverse Mills coefficient of −0.0385; the source gives the latter a p value of 0.294. Its first-stage cost-of-equity coefficient is −0.2155 with a standard error of 0.5323, providing little evidence of relevance for the exclusion variable in that equation. The matched-sample interactions are 0.2058, 0.1724, and 0.1468 across the three matching designs. Oster delta values are 7.92 for ESG, 10.56 for tone, and 25.29 for the interaction. These sensitivity results are supportive under their assumptions, but do not independently establish that unobserved confounding is absent.

The post-2018 specifications preserve positive interaction estimates of 0.1131, 0.0701, and 0.0003 across the three reported models. A common post-period indicator is ordinarily collinear with a complete set of year effects, however. Because the source reports both, its treatment of the indicator and absorbed effects requires clarification. Retaining the numerical estimates does not establish a separate effect of the 2018 governance-code revision, especially when several institutional developments occurred during the same interval.

Table 5 completes the evidence with temporal specifications, held-out prediction, lexicon stability, alternative rating interactions, dictionary comparisons, and firm-clustered inference. These supplementary results are especially useful because they include estimates that do not support a broad claim of universal robustness. Their joint presentation makes it possible to distinguish stability of the principal contemporaneous interaction from performance under stronger temporal controls or a different rating system.

Table 5. Temporal validation alternative dictionaries and supplementary inference

Measure or record	Reported values in the panel order

	A Lagged tone. Models: ROE without FE; ROA without FE; ROE with FE; ROA with FE. Parentheses are t statistics.				
	ESG	0.0085***;	0.0005;	0.0014;	−0.0012
		(2.3431); (0.2691); (0.3309); (−0.6246)			
	L.PosTone	−0.7152**;	−0.6171***;	−0.3870;	−0.2983*
		(−2.0245); (−3.7101); (−0.9965); (−1.6710)			
	ESG × L.PosTone	0.1197*;	0.1195***;	0.0877;	0.0659**
		(1.6904); (3.5841); (1.2847); (2.1064)			
	Constant	−0.4827***;	−0.1278***;	−0.9400***;	−0.2927***
		(−15.6910); (−8.8266); (−4.0647); (−2.8508)			
	Controls	YES; YES; YES; YES			
	Firm effects	NO; NO; YES; YES			
	Year effects	NO; NO; YES; YES			
	Cluster	NO; NO; Firm&Year; Firm&Year			
	Observations	7874; 7874; 7736; 7736			
	Adjusted R^2	0.1554; 0.2771; 0.4337; 0.5854			
	B Future tone placebo. Models: one year lead ROE; one year lead ROA; two year lead ROE; two year lead ROA.				
	ESG	0.0027;	0.0004;	−0.0033;	−0.0023
		(0.4930); (0.1594); (−0.8061); (−1.2906)			
	F.PosTone	0.1844**;	0.1051**;	—;	—
		(2.3841); (2.8471); —; —			
	ESG × F.PosTone	−0.0401;	−0.0071;	—;	—
		(−0.5546); (−0.2128); —; —			
	F2.PosTone	—;	—;	0.0856;	0.0115
		—; —; (0.7300); (0.2438)			
	ESG × F2.PosTone	—;	—;	0.0430;	0.0343
		—; —; (0.7724); (1.2749)			
	Constant	−0.6045**;	−0.1425;	−0.5643**;	−0.1163
		(−2.8305); (−1.6109); (−2.4257); (−1.4389)			
	Controls	YES; YES; YES; YES			
	Firm effects	YES; YES; YES; YES			
	Year effects	YES; YES; YES; YES			
	Observations	7736; 7736; 6679; 6679			
	Adjusted R^2	0.4368; 0.5926; 0.4438; 0.6016			
	C Future outcome placebo. Outcomes: next year ROE, next year ROA.				
	ESG	0.0035;			0.0005
		(1.5288); (0.5663)			
	PosTone	−0.0478;			−0.0144
		(−0.5195); (−0.3113)			
	ESG × PosTone	0.0383;			0.0260
		(0.4710); (0.7670)			
	Constant	1.1793***;			0.5501***
		(6.0110); (5.9865)			
	Controls	YES; YES			
	Firm effects	YES; YES			
	Year effects	YES; YES			
	Observations	7736; 7736			
	Adjusted R^2	0.3888; 0.5284			
	D Firm dynamics. Models: firm trends ROE and ROA; industry by year effects ROE and ROA.				
	ESG	−0.0022;	−0.0010;	0.0045**;	0.0013*
		(−1.1063); (−1.0956); (1.9767); (1.6679)			
	PosTone	−0.0623;	−0.0424;	−0.0312;	−0.0199
		(−0.6953); (−1.0597); (−0.5057); (−0.5447)			
	ESG × PosTone	0.0358;	0.0246;	0.1246***;	0.0484**
		(0.4823); (0.8086); (2.7660); (2.2096)			
	Constant	−1.9765***;	−0.6060***;	−0.7081***;	−0.1562**
		(−5.7678); (−4.3831); (−3.8828); (−2.1845)			
	Controls	YES; YES; YES; YES			
	Firm effects	YES; YES; YES; YES			
	Year effects	YES; YES; YES; YES			
	Firm trends as labeled in source	YES; YES; NO; NO			
	Industry by year effects	NO; NO; YES; YES			
	Observations	9321; 9321; 9223; 9223			
	Adjusted R^2	0.5399; 0.6765; 0.4992; 0.6316			
	E Training period 2010–2020. Models: full, basic.				
	(1) Full Model	(2) Basic Model			
	ESG	0.0032;			0.0056**
		(1.1365); (2.0121)			
	PosTone	−0.0263;			−0.0709
		(−0.3463); (−0.8611)			
	ESG × PosTone	0.1522***;			0.1806***
		(3.0222); (3.0822)			

	Constant	YES; YES			
	Controls	YES; NO			
	Firm effects	YES; YES			
	Year effects	YES; YES			
	Observations	8190; 8190			
	Adjusted R^2	0.4366; 0.3926			
	F Held out 2021. Models: full, basic.				
	Pearson correlation (predicted vs. actual)	0.3100***; 0.2435***			
	Spearman rank correlation	0.2997***; 0.2363***			
	Direct correlation: ESG vs. ROE	0.2423**; 0.2423**			
	Observations (test set)	1026; 1026			
	G Frozen 2010–2019 lexicon. Outcomes: ROE, ROA.				
	ESG	0.0045*; (1.8711); (1.3125)			0.0012
	PosTone	−0.0010; (−0.4908); (−1.2869)			−0.0012
	ESG × PosTone	0.0039***; (3.2834); (3.2500)			0.0014***
	Constant	−0.7741***; (−3.8928); (−2.7457)			−0.2162***
	Controls	YES; YES			
	Firm effects	YES; YES			
	Year effects	YES; YES			
	Observations	9317; 9317			
	Adjusted R^2	0.4046; 0.5645			
	H Other rating providers. Models: Bloomberg main, Bloomberg interaction, MSCI main, MSCI interaction.				
	PosTone	−0.0042; (−0.0600); (−1.3792); (0.4500); (0.0102)	−0.3819;	0.0551;	0.0024
	Bloomberg ESG	0.0010***; (3.0237); (0.9655); —; —	0.0005;	—;	—
	BloombergESG × PosTone	—; —; —; (1.5066); —; —	0.0104;	—;	—
	MSCI	—; —; —; (2.2166); (1.5175)	—;	0.0008**;	0.0007
	MSCI × PosTone	—; —; —; —; (0.2723)	—;	—;	0.0013
	Constant	−0.6403**; (−2.9401); (−2.9414); (−1.4213); (−1.4196)	−0.6191**;	−0.7591;	−0.7590
	Controls	YES; YES; YES; YES			
	Year effects	YES; YES; YES; YES			
	Firm effects	YES; YES; YES; YES			
	Observations	8110; 8110; 1745; 1745			
	Adjusted R^2	0.4121; 0.4122; 0.5778; 0.5775			
	I Tone split. Models: Bloomberg high, Bloomberg low, MSCI high, MSCI low.				
	Bloomberg ESG	0.0008; (1.3769); (2.9008); —; —	0.0011**;	—;	—
	MSCI	—; —; —; (3.5961); (0.8607)	—;	0.0028***;	0.0004
	Constant	−0.6292**; (−2.9280); (−2.8954); (0.0898); (−2.3544)	−0.7714**;	0.0632;	−1.3171**
	Controls	YES; YES; YES; YES			
	Year effects	YES; YES; YES; YES			
	Firm effects	YES; YES; YES; YES			
	Chow test (p-values)	P = 0.000; P = 0.0000			
	Observations	3785; 4010; 443; 1088			
	Adjusted R^2	0.4437; 0.4298; 0.5721; 0.6237			
	J Dictionary horse race. Outcomes: ROA, ROE, ROA, ROE. First two use PosTone2, last two NetTone2.				
	ESG	0.0062; (1.0561); (0.4327); (1.3348); (0.5594)	0.0055;	0.0065;	0.0061
	PosTone	−0.0659*; (−1.8613); (−1.4035); (−1.8771); (−1.3921)	−0.0976;	−0.0659*;	−0.0975
	ESG × PosTone	0.0685***; (2.8546); (2.1542); (2.8590); (2.1530)	0.1309**;	0.0683***;	0.1305**
	PosTone2	0.0007; (0.3546); (0.0631); —; —	0.0003;	—;	—
	ESG × PosTone2	−0.0008; (−0.9831); (−0.1403); —; —	−0.0002;	—;	—
	NetTone2	—; —; —; (0.7181); (0.2322)	—;	0.0010;	0.0008

ESG × NetTone2	—;	—;	−0.0009;	−0.0003
	—; —; (−1.2938); (−0.2398)			
Constant	−0.2354***;	−0.8386***;	−0.2365***;	−0.8403***
	(−2.9477); (−4.2842); (−2.9664); (−4.2740)			
Controls	YES; YES; YES; YES			
Year effects	YES; YES; YES; YES			
Firm effects	YES; YES; YES; YES			
Observations	7867; 7867; 7867; 7867			
Adjusted R^2	0.5698; 0.4148; 0.5699; 0.4148			
K Firm clustered inference. Outcomes: ROE, ROA, ROA, ROA; ratings SINO, SINO, Bloomberg, Bloomberg.				
ESG	0.0045***;	0.0012*;	—;	—
	(2.8017); (1.7629); —; —			
PosTone	−0.6158*;	−0.3330*;	—;	—
	(−1.6559); (−1.9106); —; —			
ESG × PosTone	0.1259*;	0.0639**;	—;	—
	(1.8368); (1.9996); —; —			
Bloomberg ESG	—;	—;	−0.0011;	−0.0008
	—; —; (−1.3904); (−1.0135)			
NetTone	—;	—;	−0.0081*;	—
	—; —; (−1.9152); —			
BloombergESG × NetTone	—;	—;	0.0003**;	—
	—; —; (2.2745); —			
PosTone2	—;	—;	—;	−0.0061
	—; —; —; (−1.5708)			
BloombergESG × PosTone2	—;	—;	—;	0.0002**
	—; —; —; (1.9757)			
Constant	−0.7759***;	−0.2113***;	−0.0978;	−0.1129
	(−5.4130); (−3.2902); (−1.1311); (−1.3237)			
Year effects	YES; YES; YES; YES			
Firm effects	YES; YES; YES; YES			
Cluster	Firm; Firm; Firm; Firm			
Observations	9321; 9321; 6889; 6889			
Adjusted R^2	0.4053; 0.5667; 0.5881; 0.5880			

The lagged-tone interaction remains positive in all four displayed specifications, but the firm-and-year-effects ROE estimate of 0.0877 is not significant; its ROA counterpart is 0.0659 and marked significant. Future-tone interaction estimates and current interactions predicting future outcomes are not significant. These placebos supply limited falsification evidence rather than a determination of causal direction. Firm-trend models yield interactions of 0.0358 and 0.0246 without significance, whereas industry-by-year specifications yield 0.1246 and 0.0484 with significance markings. The source's general statement about firm-specific-trend robustness therefore requires qualification.

The 2010–2020 training estimates are 0.1522 and 0.1806 for full and basic models. In the 1,026-observation held-out year, Pearson correlations between predicted and actual performance are 0.3100 and 0.2435, and Spearman correlations are 0.2997 and 0.2363. The direct ESG–ROE correlation is 0.2423 and is a benchmark rather than a prediction statistic. The frozen-lexicon interactions are positive at 0.0039 for ROE and 0.0014 for ROA, although their scale differs from the baseline measure. Direct interactions using Bloomberg and MSCI are not significant. In the dictionary horse race, the customized-tone interactions remain positive and marked significant while the additional benchmark interactions are not. Firm-only clustering preserves the main positive coefficient but changes its precision. The collective evidence favors a conditional, provider-sensitive association rather than an invariant relationship across every outcome and specification.

5. DISCUSSION

The central contribution is the identification of a relationship between ESG assessments and profitability that varies with narrative orientation. Companies do not disclose sustainability information as isolated numerical scores, and stakeholders do not necessarily interpret those scores independently of the surrounding account. The positive baseline interaction is consistent with a complementary role for favorable language in how ESG information is understood. It does not establish that narrative optimism creates operating profits, nor does it imply that a company can improve its underlying sustainability performance by increasing the number of favorable words in a report.

This interpretation refines the signaling argument by placing credibility and reception between communication and economic outcomes. A rating provides a summary assessment, while a narrative can explain how that assessment relates to priorities and future actions. When the two appear coherent, stakeholders may attach greater meaning to the quantitative signal. Yet the study does not directly measure perceived credibility, report readership, trading responses, or engagement behavior. Investor interpretation remains a plausible mechanism rather than an observed intermediate outcome. The distinction is particularly important because the main

dependent variable, ROE, reflects accounting results rather than an immediate market response to report publication.

The evidence also demonstrates why a standalone tone effect and a moderating effect should remain separate. Tone is not significant on its own in the baseline progression, while its interaction with ESG is positive. A negative unconditional correlation between tone and ROE can coexist with that positive interaction because unconditional correlations combine differences in ratings, company characteristics, and information environments. The model therefore does not support a simple prescription to communicate more optimistically. It supports examining the consistency of communication with the quantitative sustainability assessment and the circumstances under which stakeholders encounter both.

Information-environment comparisons provide suggestive boundary evidence. Nonfinancial activities, technological complexity, pollution-related scrutiny, and regional disclosure conditions may each affect how much stakeholders learn from a narrative. Their effects need not operate in the same direction. Greater scrutiny can increase the demand for explanation while constraining unsupported claims; weaker transparency can increase the usefulness of contextual language while making verification more difficult. The subgroup results are compatible with both demand-side and supply-side explanations. Because the study does not isolate them, the evidence should not be presented as proof that information asymmetry is the sole cause of the observed heterogeneity.

Institutional differences further complicate the account. The weaker interaction among high-institutional-ownership firms accords with the possibility that sophisticated analysis reduces the incremental contribution of broad linguistic cues. The stronger estimate among long-horizon institutions accords with the relevance of forward-looking sustainability information to long-term evaluation. These propositions describe different features of an ownership base and can coexist. They should not be translated into a claim that long-horizon investors are less sophisticated or more easily persuaded. A long horizon can make narrative detail relevant even where analytical capacity is substantial.

The QFII evidence is narrower still. Participation through that channel is observed, but other routes for foreign investment are not. The positive post-period triple interaction within the QFII group indicates that the relationship changes across periods, making a fixed domestic-versus-foreign interpretation particularly unconvincing. Ownership selection also matters: companies receiving QFII investment may differ in disclosure practices, governance, and investability. Those differences may affect both tone and the ESG–profitability relationship. The appropriate claim concerns the reported QFII-participation comparison, not all foreign institutions and not the independent consequences of Stock Connect.

Measurement is a substantive limitation rather than a minor technical concern. The weak agreement between SINO and the other providers shows that different ESG indicators are not interchangeable. Some alternative specifications preserve a positive interaction, while direct Bloomberg and MSCI interactions do not reach significance. A broad conclusion about universal ESG performance would overstate that evidence. The findings are most securely described as involving a SINO-based assessment in this Chinese reporting sample, with partial rather than complete support from alternative provider and dictionary exercises.

The tone variable has a related ambiguity. A favorable-word ratio can combine sentiment, topic selection, strategic emphasis, and standardized language. Words associated with green development or low-carbon activity can increase the score even where they describe a program rather than communicate emotion. The horse-race results suggest that the tailored dictionary captures information not fully reproduced by the general benchmark within the reported models. They do not establish that the information is exclusively sentiment or uniquely ESG-specific. Comparable non-ESG reports, manual annotation, and section-level analysis would help distinguish these possibilities without abandoning the transparency of dictionary methods.

Temporal evidence tempers causal interpretation. The insignificant future-tone placebos offer reassurance against some simple anticipatory accounts, but an absence of significance is not evidence that all reverse causality has been removed. Profitable companies can change both sustainability activities and reporting style, while unobserved managerial or strategic changes can affect both. The firm-trend interaction estimates are not significant, and the lagged ROE estimate with fixed effects is also imprecise. These results indicate that the strongest evidence concerns a contemporaneous conditional association rather than a demonstrated sequence from language to investor interpretation to profitability.

The selection and sensitivity analyses should be assessed with similar care. Matching can improve comparability on observed characteristics but cannot balance unobserved factors. A Heckman correction depends on a credible selection equation and a defensible exclusion restriction. The imprecisely estimated first-stage cost-of-equity coefficient limits how much assurance that exercise supplies. Oster calculations summarize coefficient stability under a specified selection framework; large delta values are informative within that framework but do not prove a causal effect. These methods address different problems and should not be accumulated as if their number alone determined identification quality.

Reporting consistency also limits exact reproduction. The source differs in its description of the institutional-ownership threshold, gives QFII coefficients in the prose that differ from the table, and overstates

some temporal and subgroup robustness patterns. Some significance stars do not align straightforwardly with the printed t statistics and stated small-cluster degrees of freedom. The simultaneous reporting of year effects and a common post-period indicator also requires explanation. These discrepancies are retained and identified because silently correcting them would replace published evidence with an undocumented reconstruction. A reproducible extension should resolve them using the estimation code and licensed source data.

For company managers, the practical implication concerns the quality of the explanation rather than its emotional intensity. Reports should connect favorable claims to measurable outcomes, define the scope of achievements, and acknowledge material uncertainties. An affirmative account can be credible where it explains verified progress and realistic plans. Overstatement may instead create a mismatch between the narrative and the evidence available to stakeholders. The reported interaction offers no justification for promotional language unsupported by substantive ESG activity.

For investors, narrative features can complement quantitative assessments when evaluated alongside measurement definitions, disclosure context, and contradictory evidence. A favorable narrative should invite examination of the activities and time horizons it describes. Differences between rating providers should also be investigated rather than averaged away without understanding their sources. Regulators can support this process through comparability, clear definitions, and verifiable reporting expectations. The study provides a rationale for improving the information environment, but does not estimate the consequences of a particular disclosure mandate or prescribe a desired linguistic tone.

Future research could combine publication timing with investor-level responses, detailed ownership channels, and independently validated text measures. Section-specific analysis could distinguish achievements, commitments, risk discussion, and compliance language. Broader reporting samples could test whether the customized lexicon captures sustainability framing or a general corporate style. Dynamic designs with credible changes in disclosure conditions could examine causal ordering more directly. The present evidence identifies a useful empirical relationship and a set of boundaries; those boundaries define the questions that a stronger explanatory design would need to resolve.

6. CONCLUSION

The underlying Chinese listed-company study associates positive ESG-report tone with a stronger relationship between SINO ESG ratings and return on equity. Its final panel contains 9,321 firm-years drawn from an initial corpus of 10,021 reports covering 2009–2021. The principal interaction estimate is positive, while tone considered separately is not significantly associated with profitability in the baseline progression. The finding therefore concerns the joint interpretation of quantitative sustainability assessments and narrative orientation rather than a general return to optimistic communication.

Investor composition and information conditions qualify that association. The source reports stronger evidence among long-horizon institutional investors, low-institutional-ownership firms, and companies without QFII participation, alongside variation across sectors, regions, and pollution categories. Alternative dictionaries, outcomes, matching procedures, and sensitivity analyses provide useful support, but the evidence is less uniform under alternative rating providers and some temporal controls. QFII participation describes a specific investment channel, and its changing association across periods should not be generalized to all foreign institutional ownership.

The most defensible implication is that sustainability communication deserves analysis as part of an information system containing ratings, observable practices, reporting incentives, and heterogeneous audiences. Credible language can help stakeholders understand substantive assessments, but a favorable word ratio does not establish credibility or causality. Preserving the published estimates alongside their measurement and reporting limitations supports a measured conclusion: narrative orientation is relevant to the observed ESG–profitability relationship, while its precise mechanism and causal consequences remain open to further investigation.

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