

An Empirical Analysis on Performance Inconsistency among Environmental, Social and Governance Components of ESG Ratings*

Minjung Park^a

^aDepartment of Economics, Ewha Womans University, South Korea

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Abstract

Purpose - The purpose of this study is to empirically investigate the degree of performance inconsistency among the Environmental, Social and Governance ratings.

Design/methodology/approach - This study performs regression analysis using the widely used ESG ratings published by the Korea Institute of Corporate Governance and Sustainability.

Findings - The results show that firms often do not show consistent performance across the Environmental, Social and Governance aspects, with excellent performance on one aspect but mediocre or poor performance on another. The paper also finds some degree of firm-level persistence in such performance inconsistency, suggesting that the traits of the firm and the industry the firm belongs to might influence whether a firm shows inconsistent performance across the three aspects.

Research implications or Originality - This paper highlights the need for researchers and practitioners to understand the underlying behavior of the individual E, S and G ratings, instead of taking them as given, in order to properly design their analyses.

Keywords: ESG Rating, Firm-Level Persistence, Sustainability

JEL Classifications: G30, L21, M14

I. Introduction

The term ESG (Environmental (E), Social (S) and Governance (G)) was officially coined in a 2004 report titled 'Who Cares Wins'. The report, published by the United Nations (UN), discussed ways to embed environmental, social and governance factors in capital markets with the ultimate goal of achieving more sustainable markets and better outcomes for societies.

Since its inception, the term ESG has become widely accepted by the financial markets, news media and the general public in both developed and developing countries, and various agencies and consulting firms such as Bloomberg, MSCI and S&P Global have started to publish ESG ratings for corporations. In Korea, a few rating agencies publish ESG ratings for Korean firms, and among them the most widely used rating data is the one published by the Korea

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^a E-mail: minjung_park@ewha.ac.kr

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Institute of Corporate Governance and Sustainability (KCGS). These ratings are used by investors, and more broadly financial markets, in their assessment of firms' sustainable practices, which are then used as one of many criteria to determine the attractiveness of investing in those firms. These ratings are also used in construction of ESG funds, thematic mutual funds or exchange-traded funds which consider environmental, social and governance factors in building their portfolios.

Rating agencies, including the KCGS, report individual ratings for each of the three components, E, S, and G, in addition to the overall ESG rating, which is the weighted average of the three individual ratings. The three individual components of ESG ratings capture conceptually distinctive aspects, and it is possible that firms ranked highly on one of the three components perform poorly on the other two, etc. If the three components exhibit highly divergent patterns, it would be important to understand the relationship among and traits of the individual E, S and G ratings to properly design the empirical studies that utilize the ESG ratings.

Employing the widely used ESG ratings published by the KCGS, I empirically examine the relationship among the individual E, S and G components. The results reveal that inconsistency in performance across the three aspects is very prevalent, with many firms being ranked highly on one and but not on another. While the performance inconsistency appears among all pairs of the individual ratings, i.e., between E and S, between E and G, and between S and G, I find that inconsistency occurs most frequently between Environmental and Governance.

Furthermore, the results show that there is some degree of firm-level persistence in such performance inconsistency. Performance inconsistency does not show up randomly across firms over time, implying that the traits of the firm and the industry the firm belongs to might play a role in determining whether a firm shows inconsistent performance across those individual aspects.

The results also indicate that the need to examine the individual ratings, in addition to the overall ESG rating, is especially high for the Environmental rating. The E rating has a particularly low correlation with the overall ESG rating, its time trend differs from those of the other individual ratings, and it has a particularly high degree of persistence at the firm level. These features imply that the E rating is likely to be inadequately represented by the overall ESG rating. The increasing emphasis on environmental issues such as climate change and air pollution further heightens the need for researchers and practitioners to pay extra attention to the individual E rating.

While the literature on corporate social responsibility (CSR) is very extensive (e.g., Benson and Humphrey, 2008; Fernando, Sharfman and Uysal, 2017), the literature on ESG, which is conceptually similar to CSR but, unlike CSR, narrowly focuses on creating concrete and quantified measures that investors can use to assess firms' sustainability practices, is more recent and fast growing. Due to the investor-focused nature of ESG, the majority of the ESG literature examines the interplay between ESG ratings and markets, such as the relationship between firm performance and its ESG rating and investors' reaction to ESG ratings (e.g., Ademi and Klungseth, 2022; Bansal, Samad and Bashir, 2021; Hartzmark and Sussman, 2019).

Since the focus of the prior literature is mostly on how the ESG ratings are related to an outcome of interest such as firm performance, researchers typically took the ESG ratings as given without much interest in the underlying patterns of the ESG ratings themselves. This paper intends to fill this gap, by taking a step back and examining ESG ratings themselves

with a focus on inconsistency among the three individual ratings. By providing deeper understanding of the relationship among the individual E, S and G ratings, this paper helps researchers and practitioners make informed choices on how to best utilize the ESG rating data in their analysis.

Specifically, the results of this paper highlight the need to jointly consider individual components of E, S and G in order to obtain a more comprehensive understanding of firms' sustainability practices, lending support to the common, but still not universal approach of including all three individual ratings simultaneously as explanatory variables in the analysis (e.g., Han, Kim and Yu, 2016).¹⁾ Simply using the overall ESG rating in the analysis, which is often done in the literature (e.g., Ademi and Klungseth, 2022) is unlikely to be sufficient as the overall ESG rating would not fully capture the diverse and often inconsistent patterns exhibited by the individual ratings. Simply including only one individual rating at a time in the analysis as explanatory variable, which is sometimes done in the literature (e.g., Kim and Lee, 2021; Meng and Baek, 2022; Velte, 2017), would be also insufficient as it could lead to omitted variable bias due to the not-too-high, but still non-negligible correlation among the individual ratings.

There are papers which make meaningful contributions to the literature by documenting and highlighting the degree of inconsistency across various rating agencies in their published ESG ratings (Berg et al., 2022; Billo et al., 2021). This paper makes a contribution to the literature by documenting and highlighting the degree of inconsistency across the three individual ratings in the rating data published by the dominant rating agency in Korea.

The rest of the paper proceeds as follows. In Section II, I discuss the dataset on ESG ratings used in the analysis. Section III examines the relationship among the individual components of the ESG ratings and provides discussions. Section IV concludes.

II. Data

Since 2003, the Korea Institute of Corporate Governance and Sustainability has published its evaluation of corporate governance for Korean companies, and in 2011 expanded its data coverage to include social responsibility and environmental responsibility. It uses a proprietary model it has developed for evaluation, taking into account international standards, such as ISO 26000, as well as legal and management circumstances in Korea.

Its evaluation utilizes corporate disclosure, e.g., business reports and sustainability reports, materials from regulatory bodies and municipalities, and media coverage. The KCGS evaluates about 1,000 companies in Korea, including all the KOSPI-listed companies, selected KOSDAQ-listed companies,²⁾ and some large financial companies that are not listed on either stock exchange.

1) Examining 25 studies that used the ESG ratings in the empirical analysis, Lee and Rhee (2020) found that only 40% of the studies employed the individual E, S and G ratings while the other 60% of the studies used the overall ESG rating only.

2) KOSPI, Korea Composite Stock Price Index, is the index of all common stocks traded on the Korea Stock Exchange. KOSDAQ, Korea Securities Dealers Automated Quotations, is the secondary trading board of Korea Exchange. KOSDAQ is benchmarked after NASDAQ, and has less rigorous listing requirements compared to the KOSPI Market. Consequently, small and medium-sized venture companies are typically listed on the KOSDAQ Market.

The ESG rating dataset published by the KCGS contains information on each firm's overall ESG rating as well as separate ratings for E, S and G. The Environmental rating is based on firms' environmental management practices and environmental performance. The Social rating is based on factors such as employee protection and consumer protection, and the Governance rating is based on aspects such as shareholder rights protection, the board of directors and auditing body.

For the individual component ratings as well as the overall ESG rating, the dataset assigns one of seven categories, S (best), A+, A, B+, B, C and D (worst). The overall ESG rating is a weighted average of the three individual ratings, and the exact weights assigned to each individual component are not publicly released. The KCGS simply states that the weights could differ across companies and industries depending on the specific circumstances under consideration.

The data used in this paper was obtained from the KCGS, and covers years from 2012 to 2021. As the newly introduced ratings E and S are missing for many KOSDAQ firms in 2012 and 2013, I use data from 2014 to 2021 for the analysis in order to make temporal comparison meaningful. Furthermore, I focus on firms listed on either KOSPI or KOSDAQ, because E and S ratings are missing for firms not listed on either stock exchange.

III. Empirical Analysis

1. Analysis on Individual E, S and G Ratings

Before I begin to examine the relationship among the individual E, S and G ratings as well as their relationship to the overall ESG rating, I report key summary statistics for those four measures in (Table 1). For all the quantitative analyses below, E, S, G and ESG ratings are converted to numerical scales, with 7 assigned to the best rating S and 1 assigned to the worst rating D.

Table 1. Summary Statistics

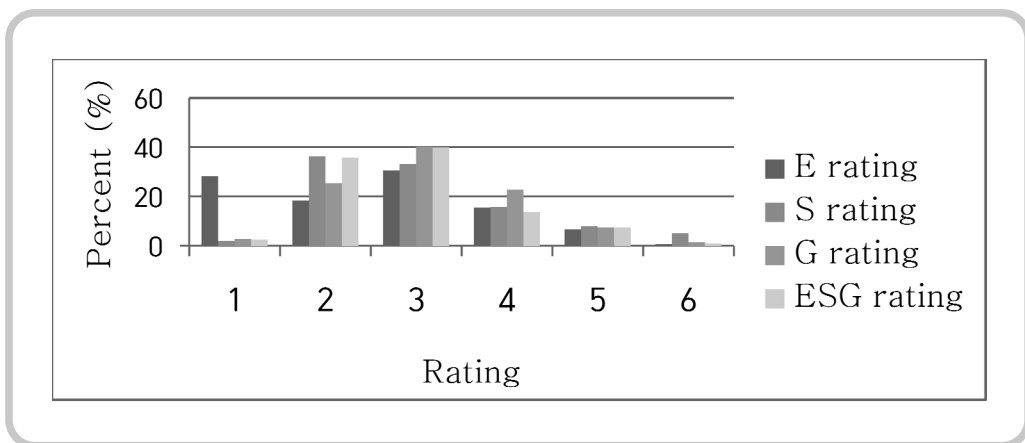
E rating	Mean	2.560
	Std. Dev.	1.268
	Min	1
	Max	6
S Rating	Mean	3.068
	Std. Dev.	1.168
	Min	1
	Max	6
G Rating	Mean	3.113
	Std. Dev.	1.009
	Min	1
	Max	7
ESG Rating	Mean	2.909
	Std. Dev.	0.982
	Min	1
	Max	6
No. Obs		7,044

From the table, we see that firms tend to score better on S and G (with the average being 3.068 and 3.113, respectively) compared to E (with the average of 2.560). Since individual E, S and G ratings measure three distinctive areas on which firms can exert effort, these numbers indicate that firms as a whole are doing better at meeting societal expectations about social responsibility and corporate governance compared to their performance regarding environmental responsibility.

We also see that no firm ever received the highest score 7 on the Environmental, Social, or ESG ratings during the entire sample period of 2014-2021. A closer look into the raw data also reveals that the highest score 7 on the Governance rating is observed for only one instance. As a result, for the rest of the analysis below I will treat score 6 as the highest score, pooling score 7 with score 6.

(Fig. 1) shows the distribution of the ratings and we see that the patterns are consistent with the summary statistics of (Table 1). E ratings have a greater mass on the left, resulting in a lower average compared to S or G ratings.

Fig. 1. Distribution of Ratings



In (Table 2), I examine the time trends for the three individual ratings as well as the overall ESG rating to see whether they exhibit similar trends.

Table 2. Time Trend

	E Rating	S Rating	G Rating	ESG Rating	No. Obs
Avg. 2014	2.843	2.802	2.891	2.880	881
Avg. 2015	2.639	2.764	2.835	2.788	829
Avg. 2016	2.615	2.886	2.954	2.887	868
Avg. 2017	2.540	2.930	3.087	2.823	852
Avg. 2018	2.522	3.033	2.899	2.748	881
Avg. 2019	2.359	3.219	3.125	2.854	875
Avg. 2020	2.406	3.405	3.304	3.026	908
Avg. 2021	2.566	3.443	3.735	3.228	950

From (Table 2), we see that the time trend exhibited by the E rating is very different from that exhibited by S, G or ESG ratings. Over time the S, G and ESG ratings tend to improve, while the E rating deteriorates although it slightly reverses the deteriorating trend towards the end of the sample period.

It is hard to imagine that firms are increasingly pursuing policies that are environmentally less friendly. To correctly interpret the deteriorating E rating, it would be important to recognize that it measures how well a given firm is perceived to perform on pursuing environmentally friendly policies vis-à-vis social expectations about the desirable level of environmental responsibility. If the improvement in firms' environmental policies is slower than the increase in the level of social expectation, the E rating will fall over time. The public's perceptions about the significance and urgency of various environmental issues such as climate change, air pollution, and plastics' impact on the earth have greatly grown over time, and the time trend of the E rating shows that firms' environment-friendly policies are not improving fast enough to catch up with such a change in the society's expectations.

Thus, the differential time trends among the E, S and G ratings can be interpreted as indicating that firms are increasingly better at meeting societal expectations about corporate governance and social responsibility of firms, while firms' efforts on environmental responsibility are falling behind the evolving social expectations. The overall ESG rating, which encompasses all three individual ratings and tends to increase over time, would fail to reveal the important fact that firms' records on environmental friendliness have in fact not improved.

2. Analysis on Relationship among E, S and G ratings

In (Table 3), I report pairwise correlation among the three individual ratings as well as the overall rating in order to see whether the information conveyed by those measures mostly overlaps or not.

Table 3. Correlation

	E Rating	S Rating	G Rating	ESG Rating
E Rating	1.000	.	.	.
S Rating	0.534	1.000	.	.
G Rating	0.258	0.513	1.000	.
ESG Rating	0.673	0.796	0.754	1.000

Correlation among the three individual ratings is not very high, indicating that these three measures capture distinctive aspects of firms' operation. In particular, the correlation between E and G is very low at 0.258. This indicates that the quality of corporate governance, such as independence of the board of directors, transparency and disclosure of information and internal control, is not closely related to environmental friendliness of the firm policies, such as energy usage and carbon footprint. The fact that the overall ESG rating has lower correlation with the E rating than with the S or G rating (the overall ESG rating's correlation with the E, S and G rating is 0.673, 0.796 and 0.754, respectively) also indicates that simply looking at the overall ESG rating in the analysis of firms' sustainability practices could particularly miss

information pertinent to the environmental responsibility of the firms' policies.

While the correlation among the individual ratings is not very high overall, it is not close to zero either. Thus, even if a researcher is interested in learning the impact of only one of the three individual ratings on, say, firm performance, all three individual ratings should be simultaneously included as explanatory variables in the regression analysis in order to avoid omitted variable bias.

To more closely examine the degree of inconsistency among the three individual ratings, I investigate how often a given firm is ranked high on one dimension but low on another. I also examine which one of the three individual ratings is most responsible for generating such an inconsistent performance.

For the analysis, I assign firms with scores 1 or 2 to 'Low' category, firms with scores 3 or 4 to 'Medium' category, and firms with scores 5 or 6 to 'High' category for each of the individual ratings. Thus, a firm will be assigned three categories, one per each individual rating, which can be expressed as an ordered triplet, e.g., (M, H, L), where the triplet is in the order of E, S and G.

I then define that a firm shows 'highly inconsistent performance' across E, S and G if a firm falls into the L category according to one of the three individual ratings and H category according to another. For instance, if a firm has (L, M, H), the firm is defined to exhibit highly inconsistent performance because it has both L and H in its triplet. I define that a firm shows 'consistent performance' across E, S and G if all three categories are identical, e.g., (H, H, H). All other cases are defined to show 'mildly inconsistent performance.' A firm exhibits mildly inconsistent performance if it has both L and M but not H in its triplet, or has both M and H but not L in its triplet.

(Table 4) shows the classification outcome, and we see that about 50% of the observations (firm/year combination) show either mildly inconsistent or highly inconsistent performance.

Table 4. Frequency of Inconsistent Performance across E, S and G

	Consistent	Mildly Inconsistent	Highly Inconsistent
2014	486 (55.16%)	383 (43.47%)	12 (1.36%)
2015	474 (57.18%)	326 (39.32%)	29 (3.50%)
2016	481 (55.41%)	337 (38.82%)	50 (5.76%)
2017	458 (53.76%)	350 (41.08%)	44 (5.16%)
2018	455 (51.65%)	405 (45.97%)	21 (2.38%)
2019	405 (46.29%)	441 (50.40%)	29 (3.31%)
2020	407 (44.82%)	475 (52.31%)	26 (2.86%)
2021	493 (51.89%)	424 (44.63%)	33 (3.47%)
All years	3,659 (51.94%)	3,141 (44.59%)	244 (3.46%)

Note: The number of observations is reported in each cell.

The prevalence of discrepancy across the three individual ratings suggests the importance of recognizing the multi-faceted nature of firms' sustainability practices and taking it into consideration in research design. It would be incomplete, and even misleading sometimes, to describe a firm's sustainability records just based on the overall ESG rating.

A firm's inconsistent performance found in (Table 4) could stem from performance discrep-

ancy between any pair among the three individual ratings, so I further examine which pair most frequently contributes to the inconsistent performance by defining the inconsistency variable for each pair of the individual ratings. For instance, I say a firm shows 'highly inconsistent performance' between E and S if one of the two ratings has category L and the other H, 'a consistent performance' between E and S if the categories for the two ratings are identical, and 'mildly inconsistent performance' between E and S otherwise. I can do the same classification for the pair of E and G and the pair of S and G as well. <Table 5> tabulates the classification outcome for each of the three pairs.

Table 5. Source of Inconsistent Performance

	Consistent	Mildly Inconsistent	Highly Inconsistent
between E and S	3,875 (55.01%)	3,097 (43.97%)	72 (1.02%)
between E and G	3,274 (46.48%)	3,601 (51.12%)	169 (2.40%)
between S and G	3,864 (54.86%)	3,120 (44.29%)	60 (0.85%)

Note: The number of observations is reported in each cell.

From <Table 5>, we see that all three pairs (E, S), (E, G) and (S, G) contribute to the inconsistency shown in <Table 4>. We also see that the performance inconsistency is more prevalent for the (E, G) pair than the other two pairs. This cannot be simply explained away by the level difference between E and G ratings. While it is true that the average value is lowest for E (2,560) and highest for G (3,113) as shown in <Table 1>, the degree of inconsistency between E and S (44.99% of mild or high inconsistency) is much smaller than that between E and G (53.52% of mild or high inconsistency) despite the fact that the mean difference between E and S (2,560 vs. 3,068) is not much smaller than the mean difference between E and G (2,560 vs. 3,113). This suggests that there is something more than the simple level difference that drives a wedge between E and G, and this pattern is consistent with the particularly low correlation between E and G reported in <Table 3>.

3. Firm-Level Persistence of Inconsistency among E, S and G Ratings

Given that the inconsistency of performance across the individual ratings E, S and G is very prevalent, one might wonder whether such inconsistency persists over time at the firm level, i.e., whether a firm that shows performance inconsistency in one year tends to exhibit performance inconsistency in another year as well. To examine this, I define a binary variable for each pair among E, S and G, which is equal to 1 if a firm shows either mild or high inconsistency between the two chosen individual ratings and 0 otherwise. I then regress the binary variable on its lagged value from the previous year. In other words, I estimate an AR(1) model. I repeat this for each of the three pairs and report the results in <Table 6>.

If there is firm-level persistence in these measures of inconsistency, we would observe a positive and statistically significant coefficient on the lagged variable. In each regression, I also include the lagged values of the other two pairs as explanatory variables in order to allow for the possibility that inconsistency in one pair in the previous year might be related to inconsistency in another pair in the current year. While the lack of other control variables in the

regression prevents me from making any inference regarding determinants of performance inconsistency, the regression results can still provide suggestive evidence on the degree of firm-level persistence in performance inconsistency.

From (Table 6) we see that the parameter estimates on ‘cross’ lagged variables are much smaller than the parameter estimate on ‘own’ lagged variable. This implies that while the correlation between inconsistency in one pair in the previous year and inconsistency in another pair in the current year is not absent, it is a lot less important than persistence of inconsistency within the same pair. We also see that there is a fair degree of firm-level persistence in the inconsistency variables, especially inconsistency involving E. The chance of a firm showing inconsistent performance for two years in a row is much greater for (E, S) and (E, G) pairs compared to the (S, G) pair. The parameter estimate on ‘own’ lagged variable is 0.205 for (S, G) pair, which is only about half of that for (E, S) pair (0.386) or (E, G) pair (0.373).

Table 6. Firm-level Persistence in Performance Inconsistency

	E-S Inconsistency	E-G Inconsistency	S-G Inconsistency
E-S Inconsistency in the previous year	0.386 (0.012) ***	0.043 (0.012) ***	-0.039 (0.013) ***
E-G Inconsistency in the previous year	0.052 (0.012) ***	0.373 (0.012) ***	0.033 (0.013) **
S-G Inconsistency in the previous year	-0.020 (0.0123) *	0.018 (0.012)	0.205 (0.013) ***
No. Obs	5,742	5,742	5,742
R ²	0.1578	0.1485	0.0465

Notes: 1. Inside the parentheses are the standard errors.
 2. *** significant at 1% significance level.
 3. ** significant at 5% significance level
 4. * significant at 10% significance level

The fact that we see some degree of firm-level persistence in performance inconsistency suggests that the pattern of inconsistency, especially when it involves the Environmental rating, is not random. Rather, it suggests that the traits of the firm and the industry the firm belongs to are likely to play a role in determining whether a firm continues to show inconsistent performance across E, S and G.

4. Firm-Level Persistence of E, S and G Ratings

The findings we have seen so far show that the main source of performance inconsistency and its persistence is the Environmental rating. Thus, it seems plausible to posit that a high degree of stickiness in the E rating for a given firm might contribute to such firm-level persistence in performance inconsistency. To investigate this possibility, I regress each of the individual ratings on firm fixed effects and the time trend. The firm fixed effects, i.e., dummy variables for each of the firms, capture time-invariant across-firm variation. If certain firms continue to exhibit a low E rating over time while others continue to exhibit a high E rating, such differences across firms will be captured by the firm fixed effects. The time trend variable

captures temporal variation common to all firms. For instance, if we see an upward trend over time in the S rating across all firms, it will be captured by the time trend variable. The time trend variable is set to be 'year - 2014', so that 2014, the first year in the sample, takes a value of 0, and 2021, the last year in the sample, takes a value of 7.

After inclusion of the firm fixed effects and the time trend, the remaining variation is firm-specific time-varying changes in the level of each rating. Thus, the remaining variation will capture temporal changes that individual firms experience idiosyncratically. If the amount of such remaining variation is smaller for the E rating than for the S or G rating, we can infer that individual firms tend to experience less idiosyncratic changes in the E rating over time compared to the S or G rating, indicating a greater firm-level persistence in the E rating.

Table 7. Regression Results

	E Rating	S Rating	G Rating
Time Variable	-0.035 (0.003) ***	0.108 (0.004) ***	0.098 (0.004) ***
Firm FE	Yes	Yes	Yes
No. Obs	7,044	7,044	7,044
R ²	0.802	0.751	0.649

Notes: 1. Inside the parentheses are the standard errors.
 2. *** significant at 1% significance level.
 3. ** significant at 5% significance level
 4. * significant at 10% significance level

From (Table 7), we see that R² is highest for E and lowest for G, with S being in the middle. This finding suggests that firm-specific temporal changes in the rating (whose amount is measured by 1-R²) are smallest for E and largest for G. In other words, there seems to be less scope for an individual firm to change its E rating, while an individual firm can make a relatively bigger change in its G rating.

Since changes in the environmental sustainability policy often require major changes to the firms' investment choices, production technology, etc. it might not be easy to change, while changes in corporate governance involve things like shareholder protection, composition of the board of directors, etc., which are easier changes to make as they do not significantly affect the main operation, namely production and investment, of the firm for the most part.

To examine this issue from a different angle, I regress a given firm's individual rating in the current year on the same firm's rating in the previous year, separately for each individual rating. Based on the findings in (Table 7), we expect the persistence to be highest for E and lowest for G, which would be represented as higher AR(1) coefficient for E compared to G. And that is exactly what we find in (Table 8). The estimated coefficient on the previous year's rating is highest for E and smallest for G, indicating that implementing new environmentally friendly policies might be harder than making positive changes to corporate governance, possibly due to technological constraints as well as the costs of making such changes.

Table 8. Persistence in Individual Rating

	E Rating	S Rating	G Rating
Previous Year Rating	0.892 (0.007) ***	0.854 (0.009) ***	0.713 (0.010) ***
Constant	0.257 (0.020) ***	0.547 (0.029) ***	0.991 (0.032) ***
No. Obs	5,680	5,680	5,680
R ²	0.734	0.612	0.472

Notes: 1. Inside the parentheses are the standard errors.

2. *** significant at 1% significance level.

3. ** significant at 5% significance level

4. * significant at 10% significance level

IV. Conclusion

In this paper, I document and highlight the degree of performance inconsistency across the three individual components of ESG rating, environmental, social and governance. The overall message of the findings is clear: Researchers and practitioners need to be aware of the need to pay attention to individual E, S and G ratings in their analysis, instead of relying on the overall ESG rating only, because the three components of the ESG rating convey distinctive and often inconsistent messages about firms' sustainability practices. The results also show that the need is greatest for the Environmental rating, because it is the biggest contributor to the presence and persistence of performance inconsistency and also because it exhibits distinctive behavior compared to S or G rating, such as deteriorating time trend and greater firm-level stickiness.

The results suggest that making changes to firm policies to improve its environmental responsibility might face significant challenges owing to technological constraints or cost implications. It would be interesting to examine the traits of industry and firm that influence the degree of difficulty in making positive changes to a firm's environmental responsibility. More broadly, investigating determinants of performance inconsistency could shed light on possible trade-offs firms face in implementing sustainable practices. These are interesting avenues of research, and I plan to pursue these research topics further in my future work.

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