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Detecting green-washing or substantial organizational communication

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Detecting Green-Washing or Substantial Organizational Communication: A Model for Testing Two-Way Interaction Between Risk and Sustainability Reporting

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Abstract: This paper contributes to the expanding landscape of methodological approaches and tools for investigating organizational sustainability communication. Our method allows for exploring two-way interactions between company risk and sustainability reporting. We present a basic but extendable method, while using only publicly available data. Our method adds additional features to established methods: It covers only risk (not returns), as theory mainly supports risk-reporting relationships and not return-reporting relationships. It tests for reverse causality of the risk-reporting relationship and links complementary explanations to different theoretical schools. Our method tests the model by employing data from a market with mandatory sustainability reporting to avoid self-selection bias.

Keywords: Environment, Social, and Governance (ESG) scores; risk; Granger causality

1. Introduction

1.1. Problem Statement

This paper uses the Overview-Design-Details (ODD) protocol of a related article [1] to provide a standardized explanation of our model of two-way interaction between risk and sustainability reporting [2–4]. Sustainability reporting integrates diverse organizational practices, including the Triple Bottom Line (TBL), Corporate Social Responsibility (CSR), or Integrated Reporting (<IR>) [5]. One problem when investigating sustainability reporting is the disputed causality it has with risk (or company performance in more general terms): Economic-theory-based researchers regard sustainability reporting as a substantial organizational communication that will reduce risk and/or increase performance of a company [6,7]. In the meantime, neo-institutional-theory-based researchers are more prone to investigating the opposite relationship. Sustainability reporting, in this context, can be critically assessed as greenwashing, and consequently, it can be assumed that high risk and/or bad performance *precede* sustainability reporting [8,9]. Unfortunately, empirical research follows these theoretical schools strictly and often only tests for one-way causalities. This technical note suggests a simple way to take both theoretical explanations into consideration at the same time. It is our intention to facilitate the use of statistics that simultaneously account for two-way interaction of sustainability reporting with risk (or company performance in more general terms).

1.2. Purpose of the Model

Our model contributes a two-way interactional perspective on the relationship between risk and sustainability reporting. Ideally, the definitive stakeholders of an organization (shareholders) have goals that align well with those of other, less salient, stakeholders, in the long term [3,4,10]. The diversity of goals, though, might lead to inter-group conflicts between stakeholders. Such conflicts could show, inter alia, in permanent issues, protests, or employee counter-narratives [11], and obstruct organizational progress [12,13]. In order to prevent stakeholder conflicts, many contemporary organizations demonstrate their stakeholder orientation by way of voluntary sustainability reporting [14,15]. This paper showcases how publicly available data can supplement insights into two-way risk-reporting relationships. We mobilize different theoretical paradigms to elaborate on the opposing effects. Overall, our technical note is helpful for future research that addresses the research question: "Which two-way interactions exist between risk and sustainability reporting"?

1.3. Research Method

1.3.1. Entities of Investigation: Listed South African Organizations

We initially selected all organizations listed at the Johannesburg Stock Exchange for which Bloomberg measures an Environment, Social, and Governance (ESG) score in the five years from 2012 to 2016 (n=91 organizations). We eliminated all organizations with missing data during this period, which reduced the sample to 59 organizations in this five-year period (n=295 organization years). There are two reasons we chose the South African setting: First, <IR> is mandatory there for all capital-market oriented companies, which offers a good selection of ESG reporters to us (economic theory) [16]. Second, South Africa is a relatively unequal society where sustainability reporting has strong legitimizing purposes for for-profit companies (neo-institutional theory) [17].

1.3.2. Independent Variables (Two-Way: Also Dependent): ESG Scores

This study applies the Environment, Social, and Governance (ESG) scores as used by Bloomberg as a proxy for corporate sustainability [18,19]. Bloomberg [19,20] appraises ESG scores based on publicly available organizational communication. The company collects data, grouped into over 200 categories for each monitored organization. Thus, using ESG scores allows the tracking of sustainability performance directly. Each category has an industry-specific weight, whose exact specifications constitute proprietary information that Bloomberg does not share in detail. Scores are normalized from zero to 100 [19]. The scores are available as an overall score (ESG score) or as single-component scores (E score; S score; G score). According to Bloomberg [19,20], the Environment score (E) reflects, e.g., carbon footprint, consumption of energy and water, spoilage, and policies of production by the organization and its suppliers. The Social score (S) measures, e.g., fair employee treatment, employee training hours, equal opportunities, and policies about safety and wellbeing, as well as the impact that the final products have on society. The Governance score (G) tracks the structure of the board (e.g., size and diversity) and its functionality (e.g., meetings frequency), an organization's involvement in policy development, and executive remuneration. Before the introduction of Bloomberg ESG measurement, many studies used data from KLD Research & Analytics. While the data is extensive and provides a broad picture of sustainability, KLD data is binary and thus less rich in terms of variance.

1.3.3. Dependent Variables (Two-Way: Also Independent): Risk

We measure total (market) risk as volatility, and disaggregate it into its two subcomponents of systematic and idiosyncratic risk [21,22]. We assess *Total Risk* by taking the standard deviation (SD) of annualized monthly returns. We calculate the volatility of stock returns (annualized from a monthly basis) to gauge *Total Risk*. We then split *Total Risk* into idiosyncratic risk and systematic risk. *Beta* measures the covariance between the volatilities of the market portfolio and the stock of the company, and represents *Systematic Risk* (also: the market risk in this industry). The difference between

Total Risk and *Systematic Risk* is a common representation of *Idiosyncratic Risk* [23]. While traditional portfolio theory [24] claims that idiosyncratic risk is irrelevant to investors as it is fully removed by diversifying a portfolio, empirical evidence shows that investors are not fully diversified [25], and idiosyncratic risk emerges from differences in organizational characteristics [23]. We suggest using the most recent five-factor model [26,27] for determining idiosyncratic risk [27]. The five-factor-model is defined as follows:

$$R_{it} - R_{ft} = \alpha_i + \beta_1 Mkt + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 Prof + \beta_5 Investment + e_{it} \tag{1}$$

Abnormal returns are represented by Rit – Rft (i = company; t = day). The market premium on the stock exchange in Johannesburg (Mkt) is computed by subtracting the risk-free rate from the market return. We use non-convertible debenture (NCD) rates (3-month) to approximate the risk-free rate. We proxy size (SMB) as the differential between large and small cap companies. High-Minus-Low (HML) is based on a book-to-market estimate (B/M), signaling the gap between lowest and highest stock values. Company profitability (Prof) is the ratio of profits (operative) to the book value of total equity. Investment trails 6-month asset growth. Residuals (i.e., idiosyncratic risk) is captured by e_{it}.

1.3.4. Control Variables

We have chosen six standard control variables to account for confounding effects from organizational characteristics [28]. All variables are annualized to match the ESG scores. Of course, future studies should select a context-specific selection of controls. Organizational size is measured in total assets (Bloomberg code—bs_total_assets). Return on Assets (ROA) (Bloomberg code—return_on_asset) controls for performance. Leverage (Bloomberg code—tot_debt_to_tot_asset) accounts for different financing choices of organizations. The market-to-book ratio (Bloomberg code—M/B) adjusts for growth opportunities. Dividend payout ratio (Bloomberg code—dvd_payout_ratio) accounts for strong bottom line performance. We also control for investment into Research and Development (Bloomberg code—R&D).

1.4. Robustness Tests for Biases

1.4.1. Propositions

Based on our literature study of the positivist literature [6,7], we first derived the propositions that better practices and reporting in Corporate Sustainability should lower the systematic and idiosyncratic (and thereby also the total) risk of an organization. Previous literature following *instrumental stakeholder theory* purports that reporting more on ESG [29–32], or separately on E [33], S [34], and G [28] reduces risk. Likewise, improving disclosure quality on existing ESG information reduces risk [16,35,36]. We test this proposition in a one-way direction:

Proposition 1: More sustainability reporting decreases (H1) total, (H2) systematic, and (H3) idiosyncratic risk.

$$\begin{aligned} TRSK_{it} = {}& \beta_0 + \beta_1 ESG_{it} + \beta_2 SIZE_{it} + \beta_3 ROA_{it} + \beta_4 DEBT_{it} + \beta_5 MB_{it} + \beta_6 DIV_{it} \\ & + \beta_7 INVEST_{it} + FEy + FEi + \varepsilon it \end{aligned} \tag{2}$$

$$\begin{aligned} BETA_{it} = {}& \beta_0 + \beta_1 ESG_{it} + \beta_2 SIZE_{it} + \beta_3 ROA_{it} + \beta_4 DEBT_{it} + \beta_5 MB_{it} + \beta_6 DIV_{it} \\ & + \beta_7 INVEST_{it} + FEy + FEi + \varepsilon it \end{aligned} \tag{3}$$

$$\begin{aligned} IDIO_{FM_{it}} = {}& \beta_0 + \beta_1 ESG_{it} + \beta_2 SIZE_{it} + \beta_3 ROA_{it} + \beta_4 DEBT_{it} + \beta_5 MB_{it} + \beta_6 DIV_{it} \\ & + \beta_7 INVEST_{it} + FEy + FEi + \varepsilon it \end{aligned} \tag{4}$$

We then conjecture—based on critical management studies [8,9]—that the subcomponents of the ESG scores might exhibit intricate relationships to risk. For instance, organizations that experienced an increase in idiosyncratic risk (e.g., due to a scandal it was involved in) might *react* with an increase in sustainable practices and reporting [23]. a reason for this reaction may be managerial opportunism [37,38]. This way, risk may also affect ESG scores in subsequent periods. We therefore explore:

Proposition 2: Higher E, S, and G scores show two-way interactions with (H4) total, (H5) systematic, and (H6) idiosyncratic risk.

$$
\begin{aligned}
TRSK_{it} \;=\; & \beta_0 + \beta_1 E_{it} + \beta_2 S_{it} + \beta_3 G_{it} + \beta_4 SIZE_{it} + \beta_5 ROA_{it} + \beta_6 DEBT_{it} + \beta_7 MB_{it} \\
+ \; & \beta_8 DIV_{it} + \beta_9 INVEST_{it} + FEy + FEi + \varepsilon it
\end{aligned}
\tag{5}
$$

$$
\begin{aligned}
BETA_{it} \;=\; & \beta_0 + \beta_1 E_{it} + \beta_2 S_{it} + \beta_3 G_{it} + \beta_4 SIZE_{it} + \beta_5 ROA_{it} + \beta_6 DEBT_{it} + \beta_7 MB_{it} \\
+ \; & \beta_8 DIV_{it} + \beta_9 INVEST_{it} + FEy + FEi + \varepsilon it
\end{aligned}
\tag{6}
$$

$$
\begin{aligned}
IDIO_{FM_{it}} \;=\; & \beta_0 + \beta_1 E_{it} + \beta_2 S_{it} + \beta_3 G_{it} + \beta_4 SIZE_{it} + \beta_5 ROA_{it} + \beta_6 DEBT_{it} + \beta_7 MB_{it} \\
+ \; & \beta_8 DIV_{it} + \beta_9 INVEST_{it} + FEy + FEi + \varepsilon it
\end{aligned}
\tag{7}
$$

We used panel regressions (year and industry fixed effects) to estimate results. For the exploratory proposition on explore two-way causal effects, we employed the Granger causality test. This helped us to understand if risk had an impact on the E, S, and G scores, or if causality was opposite. Using Granger causality, we tested how future values of variables were affected by historic values of other variables [39]. We employed regressions that were vector autoregressive (VAR). We tested this Granger causality on all risk variables, as well as the (dis)aggregated scores for E, S, and G (Table 1):

Table 1. Reverse causality tests.

Line		Risk (Total)				Risk (Systematic)				Risk (Idiosyncratic)			
		Coeff. [model 4]	Chi^2	p value	Causal direction (Granger)	Coeff. [model 5]	Chi^2	p value	Causal direction (Granger)	Coeff. [model 6]	Chi^2	p value	Causal direction (Granger)
1	ESG has no effect on risk	+	3.595	0.166	One-way	-***	10	0.006***	One-way	+	0.336	0.562	No relation
2	Risk has no effect on ESG	(from Model 1)	5.092	0.078***		(from Model 2)	0.199	0.905		(from Model 3)	1.746	0.186	
3	E has no effect on risk	-	3.197	0.202	One-way	+	12.54	0.001***	One-way	-	13.693	0.001***	Two-way
4	Risk has no effect on E		5.822	0.054***			0.008	0.995			4.722	0.094*	
5	S has no effect on risk	+***	4.203	0.122	One-way	-**	24.6	0.000***	Two-way	+***	0.706	0.702	One-way
6	Risk has no effect on S		4.442	0.100***			2.24	0.000***			76.995	0.000***	
7	G has no effect on risk	+	0.262	0.213	No relation	-***	3.57	0.475	One-way	-	0.008	0.927	One-way
8	Risk has no effect on G		1.551	0.608			7.55	0.000***			3.877	0.048**	

These analyses test for one- or-two-way effects between risk and E (Economic), S (Social), and G (Governance) scores based on Granger causality. We see that risk (systematic) is affected by total ESG and the single S score. Simultaneously, the S score is impated by all types of risk. the G score is affected by Beta. Granger Causality is present when we do not accept a hypotesis (i.e., p is smaller than 0.01; 0.05; or 0.10, respectively). Any causal relationship could be one- or two-way; Sig. levels * 1%; ** 5%; *** 10%. Sources 2012-2016: Datastream and Bloomberg.

1.4.2. Robustness Tests for Biases

We performed several procedures to test for robustness [39]. We first tested if error terms were correlated (Durbin–Watson test). For a null hypothesis to be accepted, all Durbin–Watson test statistics should be very close to the minimum level of 1.84 or higher [40]. This suggests that the regressions are free from autocorrelation. Second, we excluded both autocorrelation and heteroscedasticity by investigating cross-section standard errors from White. Third, we excluded outliers by performing data winsorization at the 1%-level [41]. Fourth, multicollinearity could not be detected [39]. Multicollinearity is seen as a problem if Variance inflation factors (VIFs) exceed the critical value of 10. In our case, their values were less than 2 (Table 2).

Table 2. Multicollinearity tests for full sample.

	TRSK_ESG	TRSK_DIS	SYS_ESG	SYS_DIS	IDIO_ESG	IDIO_DIS
Variable	*Models 1*	*Model 2*	*Model 3*	*Model 4*	*Model 5*	*Model 6*
ESG	1.084		1.084		1.084	
E		1.266		1.266		1.266
S		1.237		1.237		1.237
G		1.108		1.108		1.108
LOG(SIZE)	1.524	1.539	1.524	1.539	1.524	1.539
ROA	1.449	1.451	1.449	1.451	1.449	1.451
LOG(MB)	1.255	1.308	1.255	1.308	1.255	1.308
DEBT	1.477	1.525	1.477	1.525	1.477	1.525
DVD_PAYOUT	1.040	1.055	1.040	1.055	1.040	1.055
INVEST	1.124	1.134	1.124	1.134	1.124	1.134

Sources 2012–2016: Datastream and Bloomberg.

2. Application of the Statistical Procedure

2.1. Basic Principles of the Modelled Paradigm(s)

We test for two-way interactions since two major paradigms predict opposite causality of sustainability reporting. *Positivistic* management studies—including, e.g., risk management theory [31] and instrumental stakeholder theory—suggest that, in an initial state, non-managing shareholders have little information about the risks their organization faces. Cautious shareholders would therefore overestimate risk, withhold their financial resources, which leads to a discount of organizational value. Top managers of such an organization counteract this discount by increasing transparency on risks through voluntary, non-financial sustainability reporting. Shareholders and powerful stakeholders gain full access to the information, on average correctly evaluate these risks, and make the valuation discount disappear. Thereby, positivists argue that sustainability reporting decreases risk. In contrast, and in line with a *critical* management approach, e.g., managerial opportunism theory [37], we argue: Upon facing organizations risks—such as scandals or new, controversial technologies—organizations respond by legitimizing their actions through emphasizing sustainable practices (greenwashing; window-dressing).

2.2. Emergence of the Model

We expect the results from the model to vary substantially in other research settings as the following three parameters change: First, *self-selection* could introduce substantial endogeneity and insignificant results. ESG reporting is mandatory in our chosen South-African setting. In markets with voluntary ESG disclosure, we expect that only exemplary organizations decide to report. Second, functional fixation on measurable indicators can lead to *gaming*. Organizations can learn which indicators matter for Bloomberg's ESG scores, optimize their value, but still not be sustainable as they ignore other important, but fuzzy, sustainable practices. Third, the model will most likely yield unpredictable results in *inefficient capital markets,* where private ownership and transactions

are restricted, where information-processing capacities are limited, or where governments deny that non-sustainability (e.g., pollution or mistreating employees) is a market inefficiency that needs corrective action to maximize welfare.

2.3. Adaptation and Prediction of Managerial Decisions toward Sustainability Reporting

Internal decision models of actors can change over time, which might lead to different future conditions than the ones we encountered when testing the model. We assume that management practices such as sustainability reporting follow fads and fashions [42] and are affected by top management decisions [43]. In one scenario, sustainability may become mandatory. As organizations optimize the practice, it will stop being a distinctive feature that notably interacts with risk [44]. In another scenario, sustainability reporting may become a controversial distinction of an entrenched group of top managers, and its distinctive effects on risk will continue [45].

2.4. Details

The data stem from the South African stock market where sustainability reporting has been mandatory for years. Therefore, the model assumes equilibrium as a starting point, and organizations in the dataset optimally manage risk as the conditions in the industry and organization itself change. Models on markets where sustainability reporting is being introduced might consider interpreting results from a disequilibrium perspective. All data used in our model is publicly available (partly for fees) from Bloomberg, Johannesburg Stock Exchange, and Peregrine Securities Research, as well as from annual reports and investor relations websites of the investigated organizations.

3. Conclusions

The goal of this paper was to showcase how publicly available data can enhance our understanding of risk-reporting relationships. While the initial models test only for one-way causality, we also elaborate on the two-way nature of the risk-reporting relationship by testing for reverse causality. It was the complementarity of different theoretical perspectives that eventually enabled an in-depth understanding of the specific interactions, and also allows for broader reflections of applying this model under different conditions. We hope we can contribute to more comprehensive statistical models for future research on this risk-reporting relationship.

4. Limitations

One limitation to the method is the confiding use of Bloomberg ESG scores. The scores are a black box to researchers, since neither the eventual list of variables collected, their descriptive values, nor their industry specific weighting is available. Future research should assume command over such aggregated scores by coding annual reports and organizational communication in a reproducible way, e.g., by self-assessing these scores using Computer-Aided Text Analyses (CATA) [46]. Furthermore, two-way interactions for causality could be assessed using alternative statistical methods, such as propensity score matching. Finally, our results refer to the South African context only. Researchers applying our methodology in other settings might get results that deviate in size and significance from ours.

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