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ESG news, stock volatility and tactical disclosure

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ABSTRACT

Against the backdrop of the increasing importance of ESG investing, our goal is to explore whether ESG-related disclosure timing is tactically managed by listed companies. An international comparison is undertaken on a sample of 199 blue-chips listed firms, located in Europe, Usa and Asia. Using a dataset of 29,724 ESG news over a period of 6 years (2015–2020), we evaluate the disclosure determinants using a Probit model. We find that the probability of negative ESG news disclosure is lower when the stock is experiencing higher returns volatility. This evidence suggests that managers refrain from fuelling market instability and eroding firm's reputation capital with the disclosure of bad ESG news, adopting a type of hoarding behaviour. Similarly, managers tend to boost positive ESG-related information when the returns volatility is higher, even though the evidence is milder than for bad news. Our findings highlight that the degree of transparency on ESG matters remains incomplete and there are spaces for tactical disclosure. Concerned investors should be aware that their information on sustainability matters might be biased, especially in times of higher volatility.

1. Introduction

Increasing attention is paid by investors to non-financial corporate information. Sustainability is becoming a core aspect of firms' valuation, along with financial and economic data. There is consolidated evidence that ESG standing matters both for the cost of equity and the cost of debt. There is also evidence that ESG-related news produces significant abnormal returns, especially when reporting negative information.

Our study focuses on the link between the disclosure of ESG-related news and the volatility of stock returns. By analysing the probability of negative and positive disclosure as a function of lagged levels of returns volatility, we explore whether managers tactically steer the disclosure of ESG-related communication. The incentive for this tactical behaviour would lie in the link between ESG activities, firm's reputation and perceived riskiness.

We explore the relation between ESG news disclosure and stock volatility using a multi-national sample of blue-chips stocks listed in European, North American and Asian markets. We control for cultural, institutional, industry and firm-specific variables that in literature have been found to determine the intensity and quality of ESG information. The results confirm a lower probability of negative ESG news and higher probability of positive ones when the returns' volatility is higher.

Our results have practical implications for investors and regulators, underlining that ESG information may be incomplete or biased, especially when the stock volatility is higher.

The remainder of the paper is organised as follows: [Section 2](#) explains the research question, providing the relevant literature background, and presents the methodology adopted in the empirical analysis; [Section 3](#) provides details and descriptive statistics of the

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dataset used; Section 4 comments the main results of the empirical analysis; Section 5 illustrates a few robustness checks; Section 6 draws the conclusions and discusses a few potential limitations of the analysis, suggesting avenues for future researches on the topic.

2. Research question and methodology

In recent years, the literature on the impact of ESG factors on firms' valuation, operational metrics and investment portfolio's risk-return profile has flourished. Indeed, the gradual emergence of a consensus points towards a beneficial or neutral effect of sustainability policies, while the evidence of negative impacts is very limited (Whelan et al., 2020).

Numerous papers explore whether corporate social responsibility practices affect the cost of capital and/or the cost of debt. An almost unanimous literature highlights a negative correlation between ESG sustainability and the cost of equity, mainly motivated by a reduction of the perceived riskiness of the firm (Derwall, Vermijneren, 2007; Sharfman and Fernando, 2008; El Ghouli et al., 2011; Ng and Rezaee, 2015; Feng et al., 2015; Nirino et al., 2019). Moving to the cost of debt, the evidence is less clear-cut, even though most papers can at least confirm higher credit spreads for firms with social or environmental issues (Hoepner et al., 2016; Goss and Roberts, 2011; Erragragui, 2018; Eichholtz et al., 2019; Capelle-Blancard and Petit, 2019; Eliwa et al., 2019; Gerwanski, 2020; Naumer, Yurtoglu, 2022; Salvi et al., 2020; Raimo et al., 2021).

A different literature stream examines whether the market prices of financial instruments react to news concerning firm's ESG sustainability. The prevailing evidence shows an asymmetrical effect for positive and negative news, with a more significant impact for the latter (Gunthorpe, 1997; Curran and Moran, 2007; Mitsuyama and Shimizutani, 2015; Drago et al., 2019; Capelle-Blancard and Petit, 2019; De Vincentiis, 2022).

A limited number of papers – nearer to our approach – explore the correlation between ESG-related news or ESG rating and stock returns volatility. Indeed, Kumar et al. (2016) ascertain that firms incorporating ESG factors in their managerial strategy are characterised by lower volatility in their stock performances compared to their peers within the same industry. Similarly, Benlemlih et al. (2018) find a negative and significant impact of environmental and social disclosures on firm's total and idiosyncratic risk, whilst Sabbaghi (2022) identifies an asymmetric effect of bad and good news on observed volatility, with a larger impact of the former, moderated by firm size.

In our research, we focus on the timing of ESG-news more than on the effect of such news on returns. In fact, given the beneficial effect of sustainability policies on firm performance and risk profile, we assume that managers may find it convenient to steer the timing of ESG-related disclosure – whenever possible – with the aim to either improve investors' perception or mitigate potential reputational damages. In fact, we adopt the perspective of the stakeholders' theory and we consider ESG activities as a way to maximize shareholder wealth by creating reputational capital among customers, employees, and other stakeholders. Our work may also be placed in the framework of the literature exploring the nexus between managerial discretionary disclosure and firm's risk perception (Kothari et al., 2009a and 2009b).

We expect a correlation between the probability of ESG-related disclosure and the level of stock volatility, whilst also considering the moderating role of the firm's ESG rating (Kumar et al., 2016). In particular, we expect managers to hoard negative ESG-related news when the stock volatility is higher to avoid fuelling it further and to avert potential difficulties in market funding. Similarly, we expect managers to boost positive news when the stock return volatility is higher in order to reassure investors and to regain stability. We also expect managers' opportunistic behaviour concerning ESG-related disclosure to be moderated by the firm's ESG standing (Rezaee and Tuo, 2017).

Hypothesis 1. *The probability of disclosing bad ESG-related news decreases when the stock volatility is higher.*

Hypothesis 2. *The probability of disclosing good ESG-related news increases when the stock volatility is higher.*

More specifically, we estimate the following Probit regressions:

$$D_{BadNews_t} = DevSt_{90d} + C_{NegNews}_{90d} + ESG_{Score} + Masculinity + D_{Asia} + D_{Usa} + D_{Nordic} + FirmSpecific_Controls \quad (1)$$

$$D_{GoodNews_t} = DevSt_{90d} + C_{PosNews}_{90d} + ESG_{Score} + Masculinity + D_{Asia} + D_{Usa} + D_{Nordic} + FirmSpecific_Controls \quad (2)$$

Since our dataset also contains “mixed” events, i.e. days when both negative and positive ESG-related information is disclosed to the market, we run our specifications using two alternative versions of the dummy dependent variables. In the first version, the dummy is equal to 1 whenever bad (good) ESG news is disclosed, even if contrasting news is disclosed on the same day (D.BadNews and D.GoodNews). In the second version, we exclude all mixed events and thus the dummy is equal to 1 when purely negative or positive information is disclosed (D.BadNewsOnly and D.GoodNewsOnly).

Our core independent variable is the standard deviation of the firm's equity returns in the 90 days preceding the news disclosure. We posit that managers may hoard negative ESG news when the stock's volatility is higher in an attempt to not fuel price instability. We thus expect a negative coefficient for the variable in Eq. 1. Similarly, we expect managers to boost the disclosure of good ESG-related news when the stock volatility is higher in order to regain stability and provide reassuring signals to investors. The expected coefficient in Eq. 2 is positive (Sabbaghi, 2022).

Moving to the control variables, we expect the probability of news disclosure to increase with the lagged cumulative number of news disclosures of the same sign (positive or negative) computed over the 90 days preceding each disclosure. This positive correlation may have two kinds of explanations. First, some firms tend to communicate with stakeholders more intensely and frequently than others. Accordingly, a higher cumulative number of news disclosures published may be a sign of such “communicative” corporate

culture and may thus be related to a higher probability of new information being released in the future. Second, once a negative or positive ESG-related action or event is released, the probability of further details to be disclosed is higher. Thus, we may expect a thread of positive or negative news providing incremental information on a given topic for a certain period. In other words, we assume a phenomenon of news clustering, especially in the case of major positive or negative events. The expected coefficient of the variable is positive in both Eqs. 1 and 2.

We also include the firm's Refinitiv ESG score in the regression. The alphabetic rating is transformed into a four-notch numerical scale, where the higher ratings are equal to 4 and the lower ones are equal to 1. Given their commitment on sustainability, we expect firms with higher scores to disclose less negative ESG news and more positive news. Thus, the expected sign of the coefficient is negative in Eq. 1 and positive in Eq. 2.

The extent of firms' voluntary disclosure may be related also to the cultural values and attitudes of managers (Gray, 1988). In particular, van der Laan Smith et al., 2005 and Orij (2010) find a significant negative association between the Hofstede's dimension of masculinity and the level of corporate social disclosure. "*Feminine societies emphasize the quality of life issues while masculine societies emphasize career and financial goals. The dominant issues in the feminine society are related to those issues typically discussed by companies in CSD, i.e. environmental effects, labour practises and community involvement.*" (van der Laan Smith et al., 2005, p. 133). Based on this theoretical framework and evidence, we include among the independent variables in our model the masculinity score of the country where the firms' headquarters are located. However, considering that we have a dataset of news differentiated by tenor, we argue that the cultural effect may be different for negative and positive news. Since masculinity is related to assertiveness and achievement, we expect firms located in more masculine countries to be relatively more reluctant in disclosing bad news (negative coefficient in Eq. 1) and more willing to boast about good news (positive coefficient in Eq. 2).

To control for the effect of different institutional contexts and public pressure towards improving sustainability (Lee, Hutchison, 2005), we include dummies for three macro-regions: the United States, Asia and the Nordic European countries. These dummies capture differences in the probability of publishing positive or negative ESG news by firms located in these areas compared to Europe. The rationale for including these controls is related to the different disclosure frequencies highlighted during the qualitative analysis of the dataset. In fact, political sensitivity and public pressure to improve sustainability, as well as the regulatory framework, are not uniform in these macro-regions, potentially impacting managerial disclosure strategies therein.

Finally, we control for other firm-specific economic and financial features that in literature were found to determine the intensity of CSR voluntary disclosure (Lee, Hutchison, 2005; Rezaee and Tuo, 2017; Ali et al., 2023). In particular, we control for the firm size, that is generally associated to higher level of disclosure, by including among the regressors the natural logarithm of total assets. We control for the profitability and the leverage, as measured respectively by the return-on-asset (ROA) and the ratio total assets on net equity. To control specifically for the effect of negative economic results on the voluntary disclosure, we include a dummy variable that is equal to 1 if the firm has a negative net result in the year and 0 otherwise. Based on the evidence that firms operating in more environmentally-sensitive industries tend to disclose more ESG information (Lee, Hutchison, 2005; Gamerschlag et al., 2011), we include dummy variables for the chemical, energy and automotive sectors.

Table 3 summarises the definition and expected signs of the independent variables used in the regressions.

3. Dataset and descriptive statistics

Our sample comprises all the component firms of the Euro STOXX 50, STOXX Europe 50, STOXX Nordic 30, STOXX USA 50 and STOXX Asia/Pacific 50 stock indexes, as of 31 December 2020. Considering the partial overlap between the Euro STOXX 50 and STOXX Europe 50 compositions, the final number of companies observed is 199, out of which 99 are in Europe, 50 in the United States and 50 in Asia. In the European sub-sample, 30 companies are listed and are headquartered in Nordic countries (Sweden, Finland, Norway and Denmark). The motivation for this specific inclusion and focus is related to the enhanced sensitivity to sustainability topics characterising North-European countries.¹ All the aforementioned indexes include major blue-chip stocks with high visibility and wide representation in professionally invested portfolios. From the point of view of our research question, this ensures the largest possible relevance and potential impact of news concerning environmental, social and governance topics.

Our observation period is from 1st January 2015–31 st December 2020. In contrast to other papers, we do not limit our attention to major events such as the inclusion in or exclusion from a sustainability index, the involvement in a controversy or major environmental accidents. We consider any kind of news, be it ordinary and extraordinary, concerning environmental, social or governance sustainability. In particular, we use two indexes developed by the data provider Bloomberg: the ESG News Count Positive and the ESG News Count Negative. As the name suggests, the indexes are a raw count of stories respectively labelled as positive or negative by a machine learning model that has been trained by Bloomberg analysts. The screened news is retrieved by scanning more than 80,000 sources.

Table 1 presents a few descriptive statistics on the database of ESG news utilised in the analysis. The total number of news pieces recorded in the 6-year period amounts to 29,274, of which the majority, approximately 59 per cent, are positive. The prevalence of good news over bad news is confirmed when we examine the average number per firm in the sample: 86 against 61. The explanation may intuitively be related to management's desire to exploit the reputational effect of sustainability efforts by giving them visibility, while the negative events are not broadcasted with the same intensity.

¹ According to the 2020 Sustainable Development Report ranking referring to all UN countries, Sweden, Denmark and Finland are on the podium and Norway ranked in sixth position.

The distribution by geographical areas shows that the majority of bad news refers to the European subsample, whereas the good news is much more frequent for US companies. The intensity of ESG communication is reduced in the Asian area for both positive and negative information. This evidence is coherent with the lower level of sensitivity towards sustainability themes in the Far East.

Exploring the distribution of news by year, the percentages fluctuate. Big events concerning a few companies in the sample may explain the surge in specific years; for instance, the automotive industry's "diesel-gate" in 2015. Despite these fluctuations, an increasing trend in the number of ESG news pieces is discernible in recent years, as a natural consequence of the growing attention on sustainability topics.

Table 2 analyses the sample composition by sector. Looking at the number of firms, the dataset covers 20 business categories and is well balanced, although some sectors are slightly more represented than others (healthcare, industrial goods and services, banks and technology). When we observe the distribution of good and bad news, we can observe an abnormal weight of the automotive sector. Just six firms in the sample are the focus of 17 % of the bad news and 13 % of the good news. This over-representation is easily explained by once again recalling the so-called diesel-gate that exploded in 2015, but also bearing in mind the significant regulatory and industry-wide effort undertaken to reduce CO2 emissions, boosting hybrid and electric mobility.

4. Results

Tables 4 and 5 report the results of the probit regressions exploring whether the probability of ESG-related disclosure is correlated to past levels of stock return volatility.

Starting with the bad news, the probability is negatively and significantly correlated to the observed level of return volatility in the previous 90 days. The magnitude of the effect is particularly relevant when we use the dummy *BadNewsOnly* as our dependent variable, thus excluding disclosures of mixed tenor. The evidence suggests the existence of hoarding behaviour by management, tactically undertaken when stock instability is higher.

The cumulative number of bad news disclosures in the last 90 days is positively correlated to the probability of having to disclose further negative information. This variable captures both cross-sectional differences among individual firms and the potential thread of news following major negative events that require the disclosure of further stakeholder updates.

The coefficient of the ESG rating variable is negative. Thus, the probability of disclosing bad news is lower for firms with stronger ESG reputations. The coefficient is highly significant in all specifications.

Moving to the potential influence of the external context, firms located in countries characterised by more masculine-oriented cultures tend to publish less bad news. The geographical dummies show that firms located in Europe disclose negative ESG-related information more frequently than those settled in the USA or in APAC areas, as already highlighted in the sample description. The probability of negative ESG news disclosures is particularly reduced for firms located in Northern European countries as opposed to the rest of the continent.

When we introduce an interaction factor between the lagged standard deviation of returns and the ESG score, illustrated in the third column of Table 3, we detect a positive and statistically significant coefficient. This evidence indicates that the hoarding of negative information is more relevant for firms characterised by a lower ESG standing and, thus, by a weaker sustainability reputation.

Moving to the disclosure of good news, the evidence is more blurred. The probability of good ESG-related news is positively correlated to the observed level of return volatility in the previous 90 days when we use the *Dummy_GoodNews*, which also includes mixed events, i.e. days when both good and bad ESG-related news is recorded by the Bloomberg counter. However, the standard deviation variable loses statistical significance when we use the *Dummy_GoodNewsOnly* as the dependent variable. In the third specification, though, we can observe a positive and statistically significant coefficient for the interaction between the standard deviation of returns and the ESG score. Thus, the probability of disclosing good news in the case of a surge in its volatility level would increase only for the firms characterised by better ESG standing. This evidence could be motivated by the fact that these are firms who invest more in sustainability and who actually have positive sustainability information that may be disclosed when it is required. On the contrary, the firms with lower ESG scores may simply lack good news to disclose, even if it could potentially be beneficial to equity price stability.

The cumulative number of good news pieces disclosed in the last 90 days is positively correlated to the probability of disclosing further positive information. Once again, the variable captures both cross-sectional differences and the potential thread of news following major events.

Surprisingly, however, the coefficient of the ESG rating variable is unstable and not always significant. Thus, the relation between the probability of disclosing good news and the level of ESG standing is unclear in our analysis.

Finally, firms located in countries characterised by more masculine-oriented cultures tend to publish more good news. The geographical dummies show that firms located in the USA disclose positive ESG-related information more frequently than those settled in Europe, whereas the disclosure intensity is lower in the APAC area and in the Northern European countries.

Among the other firm specific controls, the coefficient for firm's size is positive and significant in all specifications, for both bad and good news. Thus, we can conclude that larger firms are more likely to disclose ESG information of any tenor. The sign and statistical significance of the regressors related to profitability and leverage are quite unstable, thus not indicating a clear relation with the dependent variable. The evidence emerging from previous literature is similarly mixed and unclear. Finally, the industry dummies indicate that firms operating in the automotive and energy sectors are more likely to disclose ESG information, whereas a surprising opposite evidence emerge for the chemical sector.

5. Robustness checks

In order to confirm the validity of our results, we have conducted various robustness checks.

First of all, we run our regressions by using a set of randomly-selected dates for the disclosure of positive or negative ESG information, instead of the actual ones. When randomly drawing, we ensured the empirical frequency of events in the sample was unvaried, i.e. the proportion of days with good or bad ESG news over the total number of observations. None of the explanatory variables is significant when we run the probit regressions on the set of randomly-selected news days. In particular, no correlation emerges between the stock returns volatility and the disclosure probability. Moreover, the McFadden R-squared of the specification is equal to zero.

The second robustness check deals with the existence of a potential endogeneity problem between the disclosure of ESG news and the return volatility of individual stocks. We run our regressions substituting the stock volatility with the market index volatility. No endogeneity concern arises in this case, since the disclosure of ESG news by a single firm could not possibly affect a multi-sector index and significantly impact its volatility level. The results are reported in [Tables 6 and 7](#). The correlation between the disclosure probability and the standard deviation of market index returns is confirmed and is even more significant than in previous specifications. In particular, the negative correlation between the probability of bad news and the lagged level of market volatility is very strong and the coefficient of the independent variable almost doubles in all specifications, even though the McFadden R-squared of the regression remains unvaried. In the case of good ESG news disclosure, the positive correlation with the lagged level of market volatility is strong and statistically significant. In contrast to our findings in [Table 5](#), the relation remains stable even when we use the `D_GoodNewsOnly` as our dependent variable, thus excluding all mixed events. All other explanatory variables remain significant and with the expected sign. The evidence of a strategic disclosure is thus confirmed and reinforced when we look at systematic volatility instead of total volatility.

The third robustness check deals with the issue of the over-representation of ESG-related news in the subsample of companies belonging to the automotive sector. In order to test whether our results are mainly driven by the specific dynamics of the diesel-gate scandal, we run our regressions excluding all automotive firms. The magnitude, sign and statistical significance of the main variables are unvaried in all specifications.

Finally, we run the regressions by changing the time window for the calculation of the standard deviations and the cumulative number of ESG-related news pieces. In particular, we use 30-days and 60-days as alternative periods. Consequently, the sign and significance of the coefficients remain substantially stable with these alternative specifications.

6. Discussion and conclusions

In a context in which socially responsible investing is progressively gaining more momentum, ESG-related information becomes increasingly important. Recent literature has analysed the impact of ESG standing on firms' valuation, on the cost of equity and on the cost of debt. The stakeholders' theory claims an important role of ESG activities in building the firm's reputation capital. Our study takes a different perspective and focuses on the link between non-financial disclosure and return volatility.

We find that the disclosure of ESG-related news is significantly associated with the volatility of stock returns. Our evidence shows that the probability of bad news is negatively correlated to lagged returns volatility, highlighting the appearance of hoarding behaviour. On the contrary, the probability of good news is positively associated with returns volatility. The relation also holds true when we look at systematic volatility instead of total stock volatility.

The implications of our results are manifold. For investors concerned with the ESG profile of their portfolios, it is important to consider that their information set may be biased, especially in times of high volatility, with an over-representation of positive over negative information. For regulators, the question is to decide whether to enlarge and standardise the disclosure duties for non-financial information in order to reduce managerial hoarding and opportunistic behaviours, subsequently enhancing transparency. In fact, more and more ESG news is becoming price-sensitive information and should thus be treated accordingly.

A limitation of our research is that we are not able to distinguish between environmental, social and governance news. It would therefore be interesting to explore for which kind of news the tactical disclosure timing is more frequent. Furthermore, it would be valuable to more precisely distinguish between the news that can actually be retained by management and disclosed when deemed more useful to stabilise their stock's market value from the news that the company is forced to reveal because it is related to major public incidents or controversies.

Data Availability

Data will be made available on request.

Appendix

Table 1
Bad and good ESG news – Descriptive statistics.

	Bad News	In %	Good News	In %
Total number of news pieces	12079		17195	
Average number of news pieces per firm	61		86	
Number of firms with zero news pieces	25		24	
Distribution by area				
Asia	1126	9.32 %	1971	11.46 %
USA	4432	36.69 %	8805	51.21 %
Northern European countries	783	6.48 %	1525	8.87 %
Rest of Europe	5738	47.50 %	4894	28.46 %
Distribution by year				
2020	2048	16.96 %	3424	19.91 %
2019	2448	20.27 %	3701	21.52 %
2018	2849	23.59 %	3727	21.67 %
2017	1057	8.75 %	1109	6.45 %
2016	1414	11.71 %	2083	12.11 %
2015	2263	18.73 %	3151	18.33 %
Distribution by ESG Score				
4	1478	12.24 %	2704	15.73 %
3	4426	36.64 %	6152	35.78 %
2	6009	49.75 %	7698	44.77 %
1	166	1.37 %	641	3.73 %

Table 2
Sample distribution by sector.

Sector	# Firms	# Bad news pieces	# Bad news pieces per firm	# Good news pieces	# Good news pieces per firm
Automobiles and Parts	6	2054	342	2294	382
Banks	20	1821	91	1777	89
Basic Resources	4	191	48	223	56
Chemicals	4	65	16	49	12
Construction and Materials	4	7	2	13	3
Consumer Products and Services	7	170	24	429	61
Energy	9	1292	144	2315	257
Financial Services	5	361	72	129	26
Food, Beverage and Tobacco	10	423	42	348	35
Health Care	29	1598	55	2237	77
Industrial Goods and Services	29	1098	38	874	30
Insurance	9	45	5	72	8
Media	4	49	12	242	61
Personal Care, Drug and Grocery	7	121	17	117	17
Real Estate	1	0	0	3	3
Retail	10	686	69	992	99
Technology	19	1372	72	2554	134
Telecommunications	13	364	28	573	44
Travel and Leisure	3	55	18	55	18
Utilities	6	307	51	1899	317
	199	12079	57	17195	86

Table 3
Independent variables.

Name	Definition	Expected sign	Mean	Max	Min
DevSt90d	Standard deviation of daily stock returns computed with simple average on the 90 days preceding the disclosure of ESG-related news.	- (bad news); + (good news)	0.0164	0.0746	0.0026
DevStIndex90d	Standard deviation of daily market index returns computed with simple average on the 90 days preceding the disclosure of ESG-related news.	- (bad news); + (good news)	0.0104	0.034	0.0046
CumNegNews90d	Cumulative number of negative ESG news pieces published on stock i in the last 90 working days.	+	13.36	3.263	0

(continued on next page)

Table 3 (continued)

Name	Definition	Expected sign	Mean	Max	Min
CumPosNews90d	Cumulative number of positive ESG news pieces published on stock <i>i</i> in the last 90 working days.	+	18.42	2.320	0
ESG_Score	Refinitiv ESG score of stock <i>i</i> , expressed on a 4-notch scale (4 = top scores; 1 = lowest scores).	-(bad news); +(good news)	2.89	4	1
Masculinity	Hofstede cultural dimension of masculinity referred to the country where the firm's headquarters are located	-(bad news); +(good news)	55.51	95	5
D_Asia	Dummy variable whose value is equal to 1 if the firm's headquarters are located in the Asia-Pacific area.	-	0.25	1	0
D_Usa	Dummy variable whose value is equal to 1 if the firm's headquarters are located in the United States of America.	-(bad news); +(good news)	0.25	1	0
D_Nordics	Dummy variable whose value is equal to 1 if the firm's headquarters are located in the Scandinavian countries	-	0.15	1	0
Log_Asset	Natural logarithm of total assets in the year of news' disclosure	+	7,77	9,45	5,28
ROA	Net result on total assets in the year of news' disclosure	+/-	0,06	-0208	1,09
Loss	Dummy variable whose value is equal to 1 if the firm's net result is negative in the year	-(bad news); +(good news)	0,05	1	0
Leverage	Total assets on net equity in the year of news disclosure	+/-	5174	150,94	-23,43
D_Chemical	Dummy variable whose value is equal to 1 if the firm disclosing the news belongs to the chemical sector	+	0,02	1	0
D_Energy	Dummy variable whose value is equal to 1 if the firm disclosing the news belongs to the energy sector	+	0045	1	1
D_Automotive	Dummy variable whose value is equal to 1 if the firm disclosing the news belongs to the automotive sector	+	0,03	1	0

Table 4

The probability of negative ESG-related news disclosure.

	Dependent variable: D_BadNews	Dependent variable: D_BadNewsOnly
DevSt	-1.85 * * (-2.72)	-4.148 * * * (-5.64)
C_NegNews	0.003 * * * (68.80)	0.002 * * * (52.89)
ESG_Score	-0.122 * * * (-16.93)	-0.125 * * * (-16.33)
Masculinity	-0.002 * * * (-6.59)	-0.002 * * * (-5.77)
D_Asia	-0.175 * * * (-7.80)	-0.275 * * * (-11.85)
D_Usa	-0.066 * * * (-4.59)	-0.06 * * * (-3.71)
D_Nordic	-0.158 * * * (-7.05)	-0.134 * * * (-5.94)
DevSt* ESG_Score		1.797 * (1.90)
ROA	0.40 * * * (3.76)	-0.09 (-0.75)
Loss	0.142 * * * (6.32)	0.04 * (1.66)
Log_Asset	0.25 * * * (20.46)	0.18 * * * (14.70)
Leverage	0.002 * * * (3.58)	0.005 * * * (6.99)
D_Chemical	-0.33 * * * (-6.38)	-0.33 * * * (-6.31)
D_Energy	0.36 * * * (17.78)	0.33 * * * (15.39)
D_Automotive	0.50 * * * (25.52)	0.46 * * * (22.03)
Mc Fadden R-squared	0.1709	0.1350
N. Obs	212.211	214.544
N. Obs with Dep. = 1	10.956	8.623

The regressions are all conducted with the Probit method. The dependent variables are D_BADNEWS and D_BADNEWSONLY, as defined in Section 2. The independent variables are described in Table 3. All specifications are run controlling for time trends. The t-stats are reported in brackets under each coefficient: * = significant at the 10 % level; ** = significant at the 5 % level; *** = significant at the 1 % level with a two-tailed test.

Table 5
The probability of positive ESG-related news disclosure.

	Dependent variable: D_GoodNews	Dependent variable: D_GoodNewsOnly	
DevSt	2.89 ** (4.82)	-0.63 (-1.00)	-2.74 (-1.23)
C_PosNews	0.004 *** (95.52)	0.003 *** (79.89)	0.003 *** (79.71)
ESG_Score	-0.02 *** (-2.83)	-0.003 (-0.47)	-0.017 (-1.19)
Masculinity	0.003 *** (10.69)	0.006 *** (16.61)	0.006 *** (16.59)
D_Asia	-0.365 *** (-18.06)	-0.40 *** (-19.33)	-0.41 *** (-19.38)
D_Usa	0.189 *** (14.93)	0.195 *** (14.85)	0.195 *** (14.87)
D_Nordic	0.128 *** (6.76)	0.125 *** (6.12)	0.123 *** (6.01)
DevSt* ESG_Score			1.27 (1.58)
ROA	0.09 (0.94)	-0.30 *** (-298)	0.31 *** (-3.08)
Loss	-0.09 *** (-4.30)	-0.175 *** (-7.69)	-0.173 *** (-7.61)
Log_Asset	0.328 *** (30.38)	0.318 *** (28.23)	0.317 *** (27.91)
Leverage	-0.015 *** (-14.48)	-0.018 *** (-16.02)	-0.017 *** (-15.85)
D_Chemical	-0.269 *** (-4.53)	-0.23 *** (-3.77)	-0.23 (-3.76)
D_Energy	0.455 *** (27.79)	0.375 *** (21.61)	0.375 *** (21.57)
D_Automotive	0.435 *** (22.36)	0.459 *** (22.76)	0.462 *** (22.82)
Mc Fadden R-squared	0.2059	0.1678	0.1679
N. Obs	223.115	225.791	225.791
N. Obs with Dep. = 1	15.966	13.290	13.290

The regressions are all conducted with the Probit method. The dependent variables are D_GOODNEWS and D_GOODNEWSONLY, as defined in Section 2. The independent variables are described in Table 3. All specifications are run controlling for time trends. The t-stats are reported in brackets under each coefficient: * = significant at the 10 % level; ** = significant at the 5 % level; *** = significant at the 1 % level with a two-tailed test.

Table 6
The probability of negative ESG-related news disclosure in times of market-wide turbulence.

	Dependent variable: D_BadNews	Dependent variable: D_BadNewsOnly	
DevStIndex	-4.63 *** (-4.85)	-7.93 *** (-7.62)	-23.00 *** (-6.09)
C_NegNews	0.003 *** (68.77)	0.002 *** (52.62)	0.002 *** (52.64)
ESG_Score	-0.12 *** (-16.48)	-0.12 *** (-15.78)	-0.18 *** (-11.23)
Masculinity	-0.002 (-6.81)	-0.002 *** (-6.02)	-0.002 *** (-5.94)
D_Asia	-0.18 *** (-8.26)	-0.28 *** (-12.09)	-0.28 *** (-12.14)
D_Usa	-0.08 *** (-5.27)	-0.04 *** (-2.82)	-0.04 *** (-2.83)
D_Nordic	-0.16 (-7.08)	-0.14 *** (-6.01)	-0.13 *** (-5.92)
DevSt* ESG_Score			5.72 *** (4.19)
ROA	0.41 *** (3.79)	-0.08 (-0.66)	-0.07 (-0.58)
Loss	0.142 *** (6.39)	0.03 (1.38)	0.04 (1.54)
Log_Asset	0.25 *** (20.53)	0.19 *** (14.85)	0.19 *** (14.91)

(continued on next page)

Table 6 (continued)

	Dependent variable: D_BadNews	Dependent variable: D_BadNewsOnly	
Leverage	0.003 * ** (−3.73)	0.005 * ** (7.08)	0.005 * ** (7.13)
D_Chemical	−0.33 * ** (−6.35)	−0.33 * ** (−6.25)	−0.22 * ** (−6.21)
D_Energy	0.359 * ** (17.96)	0.33 * ** (15.60)	0.33 * ** (15.61)
D_Automotive	0.499 *** (25.52)	0.45 * ** (21.64)	0.45 * ** (21.61)
Mc Fadden R-squared	0.1712	0.1356	0.1358
N. Obs	213.153	215.489	215.489
N. Obs with Dep. = 1	10.961	8.625	8.625

The regressions are all conducted with the Probit method. The dependent variables are D_BADNEWS and D_BADNEWSONLY, as defined in Section 2. The independent variables are described in Table 3. All specifications are run controlling for time trends. The t-stats are reported in brackets under each coefficient: * = significant at the 10 % level; ** = significant at the 5 % level; *** = significant at the 1 % level with a two-tailed test.

Table 7

The probability of positive ESG-related news disclosure in times of market-wide turbulence.

	Dependent variable: D_GoodNews	Dependent variable: D_GoodNewsOnly	
DevStIndex	4.72 * ** (5.82)	4.52 * ** (5.42)	7.45 * ** (6.17)
C_PosNews	0.004 * ** (96.02)	0.003 * ** (80.37)	0.003 * ** (80.29)
ESG_Score	−0.016 * * (−2.47)	0.007 (1.15)	0.02 * ** (2.67)
Masculinity	0.003 * ** (10.59)	0.006 * ** (16.54)	0.006 * ** (16.61)
D_Asia	−0.37 * ** (−18.32)	−0.41 * * (−19.55)	−0.40 * ** (−19.22)
D_Usa	0.19 * ** (14.78)	0.19 * ** (14.62)	0.18 * ** (14.30)
D_Nordic	0.13 * ** (6.60)	0.12 * ** (6.01)	0.12 * ** (6.04)
DevSt* ESG_Score			−1.13 * ** (−3.43)
ROA	0.09 (0.90)	−0.31 * ** (−2.99)	−0.29 * ** (−2.93)
Loss	−0.08 * ** (−4.03)	−0.18 * ** (−8.03)	−0.17 * ** (−7.58)
Log_Asset	0.32 * ** (30.02)	0.32 * ** (28.30)	0.31 * ** (27.71)
Leverage	−0.014 * ** (−14.06)	−0.017 * ** (−16.03)	−0.017 * ** (−15.59)
D_Chemical	−0.27 * ** (−4.60)	−0.23 * ** (−3.81)	−0.24 * ** (−3.87)
D_Energy	0.46 * ** (28.20)	0.38 * ** (21.85)	0.38 * ** (21.99)
D_Automotive	0.45 * ** (23.48)	0.47 * ** (23.38)	0.47 * ** (23.40)
Mc Fadden R-squared	0.2062	0.1683	0.1682
N. Obs	223.785	226.461	225.791
N. Obs with Dep. = 1	15.968	13.292	13.290

The regressions are all conducted with the Probit method. The dependent variables are D_GOODNEWS and D_GOODNEWSONLY, as defined in Section 2. The independent variables are described in Table 3. All specifications are run controlling for time trends. The t-stats are reported in brackets under each coefficient: * = significant at the 10 % level; * * = significant at the 5 % level; * ** = significant at the 1 % level with a two-tailed test.

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