

The Opaque Scorecard: Environmental, Social and Financial Information during Covid-19*

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Abstract

We show that firms with higher environmental and social (ES) capital display lower financial reporting quality (FRQ) during the Covid-19 crisis. We conjecture that this substitution, which did not exist pre-Covid-19, is driven by firm reliance on the signaling value of ES information to stakeholders, and the muted signaling value of FRQ during the pandemic uncertainty. The result is robust to using ES scores or (social) media sentiment, and it holds estimating standard and synthetic difference-in-differences. Consistent with our predictions, the ES - FRQ substitution is stronger in countries with more government intervention through income support and debt relief, especially if those countries are richer or have weaker legal rights. At the firm level, the result is stronger for firms with worse governance or management practices, when the CEO pay is not linked to shareholder returns or that of senior executives to sustainability objectives, and with lower strategic or institutional ownership. Last, we uncover that higher ES firms display higher variability in depreciation and amortization expenses, intangible assets, R&D expenses, inventories, and labor costs during Covid-19.

Keywords: environmental, social, governance, ESG, financial reporting quality, Covid-19, crisis

JEL codes: M14, M41, M42, M49

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1 Introduction

Environmental and social (ES) reporting is at the center of business and policy debates. Initiatives range from the Business Roundtable “Statement on the Purpose of a Corporation” for the benefit of all stakeholders to the European Union’s incremental proposals to amend corporate sustainability reporting.¹ Pressures for ES disclosure are also high in the U.S., where around 83% of companies registered the Securities and Exchange Commission file sustainability information (Amel-Zadeh and Serafeim, 2018; Christensen *et al.*, 2021). A new equilibrium is emerging in which ES disclosure accompanies the filing of financial information. This echoes the seminal idea of Kaplan and Norton (1992), who argued that financial and non-financial information should be jointly disclosed in the form of a “balanced scorecard.”

The Covid-19 crisis put into the spotlight well-established concerns about disclosure and financial reporting quality (FRQ) in distress times. A long-standing literature focused on the consequences of disclosure and potential externalities stemming from changes in financial reporting during economic downturns (Leuz and Wysocki, 2016). Recently, deHaan *et al.* (2023) documented only perceived (but not actual) effects of the Covid-19 shock on FRQ. The pandemic also reignited a literature on the potential role of ES attributes in navigating a crisis. Lins *et al.* (2017) have shown that ES information insulated firms during the global financial crisis. The proposed mechanism was that high (pre-crisis) ES levels built social capital (trust) with stakeholders and investors, which paid off during the economic downturn. However, recent work is split on whether such ES trust mechanism was active (Ding *et al.*, 2021) or not (Bae *et al.*, 2021; Demers *et al.*, 2021) during the Covid-19 pandemic.

In this paper, we study whether a “balanced scorecard” disclosing financial and non-financial (ES) information may have become unbalanced during the Covid-19 crisis. Our conjecture is that if the ES trust mechanism remains active, then higher ES firms facing uncertain accounting results may rely on their social capital with stakeholders and increase

¹See the Business Roundtable’s “Statement on the purpose of a corporation” and the “Directive (EU) 2022/2464 of the European Parliament and of the Council of 14 December 2022”, accessed February 24, 2023.

reporting opaqueness. We ground our predictions in the signaling values of ES and FRQ which may be balanced pre-Covid-19, but become asymmetric during the pandemic. While the signal transmitted by ES information may appeal positively to stakeholders, the signaling value of FRQ was more muted during the crisis. This is so for at least two reasons. First, the market uncertainty induced by Covid-19 could have generated incentives for firms to disclose noisier (opaque) financial information waiting for events to unfold. Second, the market distress was accompanied by government-provided stimuli, access to which often required less financial information than market-based financing. Therefore, we argue that, by drawing on their social capital “stock,” higher ES firms had stronger incentives to lower FRQ during the Covid-19 crisis.

To assess the proposed ES - FRQ substitution effect during Covid-19, we construct a database of 7,212 listed firms from 82 countries between 2017 and 2021. Our analysis exploits the Covid-19 shock to international markets, which occurs in 2020 and the generated market uncertainty follows through 2021. We find that during good economic times there is no clear relationship between ES and FRQ. However, we systematically show that during Covid-19 a substitution effect emerges with higher ES levels being related to lower FRQ. Such effect is robust to controlling for time-varying firm financial and governance characteristics, firm fixed effects, and conservative clustering of standard errors accounting for country-time characteristics. It remains unchanged when using environmental and social information separately, and alternative definitions of FRQ. Finally, it holds both in dynamic settings (using contemporaneous ES and FRQ measures), and when designing standard and synthetic difference-in-differences estimations showing that high pre-Covid-19 ES levels are related to lower FRQ during Covid-19. Parallel trends and placebo crisis analyses corroborate the results.

Next, we confirm our prediction that the ES - FRQ substitution effect is stronger in countries with more government intervention through income support and debt relief, non-market mechanisms which arguably reduced the signaling value of FRQ. Interestingly, we show that

this result is stronger in richer countries (which feature stakeholders responding to ES information), and in countries with weaker legal rights protecting financing contracts. Exploring firm governance heterogeneity, we find that the result is stronger for firms with worse governance or management practices (two proxies of long-term shareholder value monitoring), and when CEO pay is not linked to shareholder returns or the pay of senior executives to ES objectives (two proxies of incentives to monitor). Ownership concentration also matters, with the documented substitution effect materializing when firms exhibit less strategic and institutional holdings, and thus a potential detachment from owners' long-term interests. Furthermore, we uncover the accounting channels through which higher ES levels relate to lower FRQ (or higher accounting opaqueness). Higher ES firms display higher variability in depreciation and amortization expenses, intangible assets, R&D expenses, value of inventories, and labor costs during Covid-19.

Finally, we move beyond analyst-constructed ES data and confirm our results using non-financial firm information automatically generated through natural language processing algorithms. While ES information based on standardized data gathering schemes is suited for our study, a sentiment analysis of firm environmental, social and governance characteristics present in news and social media allows us to reduce two concerns. First, it captures information trends from a wide array of unstructured sources. Second, measures based on machine learning on such big data allow to check for potentially biased results due to human data gathering flaws.

Contributions to the Literature Our paper contributes to three strands of literature. First, we contribute to a literature that found mixed effects on the relationship between ES information and FRQ. While [Kim *et al.* \(2012\)](#) show that high ES firms are less likely to engage in earnings management, [Petrovits \(2006\)](#) and [Prior *et al.* \(2008\)](#) find the opposite; [Chih *et al.* \(2008\)](#) provide inconclusive evidence on the ES - FRQ relationship. Using exogenous variation provided by the Covid-19 shock, we show that an otherwise mixed ef-

fect in good economic times becomes significant with higher ES being associated with lower FRQ in a systemic crisis. In addition, we highlight which governance characteristics of the firm can alleviate or exacerbate the substitution effect between financial and non-financial information.

Second, the paper speaks to a timely literature on the use of financial information during Covid-19. [deHaan *et al.* \(2023\)](#) argue that actual FRQ does not decrease during the pandemic, only its perception. The latter may be due to government interventions ([Bischof *et al.*, 2020](#)) affecting firm accounting ([De Vito and Gómez, 2020](#)). We add to our previous contribution that—while there may be unclear results on average FRQ for all firms—during the Covid-19 crisis higher ES firms exhibit lower FRQ. Speaking to the literature on government interventions ([Leuz and Wysocki, 2016](#)), we show that our results are stronger with more government interventions for firm liquidity, when the economies are rich or have low legal enforcement capabilities.

Third, we respond to the call for an economic analysis of ES information ([Edmans, 2023a](#)) through design-based approaches to accounting ([Leuz, 2022](#)). While we acknowledge that ES information may be noisy or depend on analyst perception ([Edmans, 2023b](#)), a feature partially shared with FRQ estimation (e.g. [Dechow *et al.* 2010](#)), we underscore that it does relate to mechanisms that help to gauge firm value.² Accordingly, our work contributes by using mainstream economic analysis based on signaling theory to bring a novel facet to the role of ES information in times of crisis ([Lins *et al.*, 2017](#); [Flammer and Ioannou, 2021](#); [Albuquerque *et al.*, 2020](#); [Ding *et al.*, 2021](#)) and reveals how financial and non-financial information may become unbalanced. Last, we are able to add to a literature that has examined how financial audit risk varies with ES levels ([LópezPuertas-Lamy *et al.*, 2017](#)); we show that it is in times of a crisis and open channels for non-market behavior that high ES firms may lower FRQ.

²Responding to pressures to disclose ES information, earnings calls increasingly include firm sustainability characteristics ([Bochkay *et al.*, 2021](#)).

2 Signaling through ES and FRQ during Covid-19

The Covid-19 crisis shares its systemic nature with other economic distress periods, such as the Asian tigers in 1997, the dot.com bubble in 2001, the global financial crisis in 2007, and the European sovereign debt crisis in 2011. But it is a special case since its source was exogenous to firm and macroeconomic fundamentals, and it was not triggered by financial misbehavior or misguided regulatory oversight. It came along with quick restrictions to production and mobility, and lengthy disruptions to supply chains (and international contracts), with major implications for global listed firms around the world.

The responses to the health pandemic were accompanied by stimuli packages to firms and relaxed corporate disclosure (see, e.g., the Oxford Covid-19 Government Response Tracker).³ These interventions may have helped economies withstand a high uncertainty period, but may have also altered market mechanisms, among which information transmission to outside parties. Discerning informational distortions (Leuz and Wysocki, 2016) through design-based approaches to accounting (Leuz, 2022) can help to uncover whether financial and non-financial disclosure became unbalanced during Covid-19.

A first set of evidence on the role of financial information optimistically indicates that FRQ fundamentals have not been altered during Covid-19 (deHaan *et al.*, 2023). Some argue that certain accounting channels served to immunize firms during the pandemic (Demers *et al.*, 2021). Others document that the ES information signal remains valid, as it was during the global financial crisis (Ding *et al.*, 2021). Our conjecture is that analyzing these dimensions separately provides an incomplete picture of the nuances of firm disclosure responses to Covid-19 uncertainty. An average firm may not alter FRQ during the crisis, and a high ES firm may have the social capital needed to navigate uncertainty. Yet, the government responses to Covid-19 may have affected differently their use of financial and non-financial information.

In a financial crisis, both types of information may appeal to stakeholders, debt and

³<https://www.bsg.ox.ac.uk/research/covid-19-government-response-tracker>, accessed February 24, 2023.

equity providers. But unlike in the global financial crisis, when the bank channel was blocked and capital markets drained, government support to firms and markets largely reduced the necessity to signal through FRQ (e.g. reducing the cost of not receiving bank debt (Duro *et al.*, 2022)). This is even more so for firms that maintained high levels of ES disclosure, which would continue to act as a signal of high social capital with all types of stakeholders (e.g. Ding *et al.* 2021). Consistently, high ES firms could have the advantage of choosing to wait for the crisis to reveal its dynamics before transmitting more transparent financial information.⁴ We thus predict that during Covid-19, a separating equilibrium emerges with higher ES firms increasing accounting opaqueness (lowering FRQ), instead of a pooling equilibrium in which both high and low ES firms would show similar FRQ.

Adding to the evidence on the US market (deHaan *et al.*, 2023), Buchetti *et al.* (2023) discuss how FRQ may decrease during Covid-19 largely due to the intensity of government intervention in providing non-market liquidity to firms. Indeed, the initial Covid-19 cash crunch could have led to decreases in the sales of listed firms of 50% to 70% (De Vito and Gómez, 2020), with potentially fatal liquidity effects swiftly curtailed by government relief mechanisms. Thus, the timing-indistinguishable Covid-19 pandemic and government responses substantially altered firms’ incentives on the use of information. Building on our first prediction, we posit that the substitution effect between ES and FRQ signals is stronger in contexts with a higher intensity of government economic support to firms. Such environment further reduces the signaling role of FRQ (and the cost of accounting opaqueness), while able firms can choose to signal to stakeholders through ES information. Having both incentives and ability to substitute the two information signals is key. Extending the second prediction, we propose that such government-induced incentives and firm ability are higher when (a) firms act in richer markets (with more “sophisticated” stakeholders responding to social capital signals), and (b) markets feature lower enforcement of laws protecting contracts (e.g. on market-based financing).

⁴Strategic disclosure of ES information can alleviate pressure on other firm fundamentals and management decisions (Rajan *et al.*, 2023).

While our predictions are general, we expect the signals’ substitution to be aggravated or alleviated by the characteristics of firm-level mechanisms protecting the long term interest of shareholders. First, echoing the potential shortcomings of corporate multi-objective functions (Jensen, 2002), with poorer governance and management practices decision makers may more readily engage in risky signal substitution for short-term benefits during market uncertainty. Second, this aggravation of the signals’ substitution effect can further manifest if executives’ compensation, known to respond to financial and non-financial targets (Cohen *et al.*, 2023), is not tied to long-term shareholder value or firm sustainability. Third, the short-term substitution of information signals in a crisis can be dampened by closer monitoring by strategic owners (see, e.g., Shleifer and Vishny 1986). In such cases the preferences of shareholders are more easily transmitted on both financial and non-financial objectives (see, e.g., Hart and Zingales 2017), and the monitoring of both dimensions is arguably more effective in the presence of institutional blockholders (Azar *et al.*, 2021).

3 Data and Variables

Sources We draw on multiple data sources with the comprehensive international coverage required to examine empirically our theoretical predictions. We retrieve financial accounting information from Worldscope and environmental, social and governance (ESG) data from ASSET4 (both previously owned by Thomson Reuters and now integrated in Refinitiv). Covid-19 government policies are obtained from the Oxford Covid-19 Government Response Tracker, and macroeconomic and regulatory data come from the World Bank’s World Development Indicators. We start from a sample of about 39,000 listed firms around the world for which we have sufficient financial information to compute FRQ. We then merge these data to available ES, governance and ownership information which yields a final unbalanced panel of 7,212 publicly listed non-financial firms from 82 countries between 2017 and 2021.

To validate results based on analyst-imputed scores, we also gather ESG sentiment data

from MarketPsych. These data, based on natural language processing of news and social media, allow us to reduce concerns on analyst-biased information, as well as to confirm the results using an extended sample of more than 14,000 firms.

FRQ models Our main measure of FRQ is based on computing accruals following [Dechow et al. \(1995\)](#) and as used in an international context by [Leuz et al. \(2003\)](#). We start by specifying accruals as:

$$Accruals_{it} = \Delta CA_{it} - \Delta Cash_{it} - \Delta CL_{it} + \Delta STD_{it} + \Delta TP_{it} - Dep_{it}, \quad (1)$$

where ΔCA_{it} is the change in current assets, $\Delta Cash_{it}$ is the change in cash and cash equivalents, ΔCL_{it} is the change in current liabilities, ΔSTD_{it} is the change in short term debt, ΔTP_{it} is the change in income taxes payable, and Dep_{it} is the depreciation and amortization for firm i in year t . Similar to [Leuz et al. \(2003\)](#), if a firm does not report information on taxes or short term debt, we assume the changes in these variables to be zero.

Next, we estimate discretionary (abnormal) accruals as:

$$\begin{aligned} Accruals/TA_{it-1} = & \beta_1(1/TA_{it-1}) + \beta_2((\Delta Rev_{it} - \Delta Rec_{it})/TA_{it-1}) \\ & + \beta_3(PPE_{it}/TA_{it-1}) + \epsilon_{it}, \end{aligned} \quad (2)$$

where TA_{it-1} is the value of total assets, ΔRev_{it} is the change in revenues, ΔRec_{it} is the change accounts receivable, and PPE_{it} is the value of property, plant and equipment. We estimate equation 2 for each year-industry pair (using NAICS3 codes).⁵ We compute $Abacc_{it}$ as the difference between actual and predicted accruals. Larger values of $Abacc_{it}$ correspond to lower accrual quality. We specify our preferred dependent variables as the percentile rank of the absolute value of abnormal accruals (i.e. $AbaccRank_{it}$) or the absolute

⁵We include pairs with at least 10 observations; for robustness we ensure results do not change when limiting to 20 observations per year-industry pair. We estimate equation 2 for all firms with sufficient accounting information, which is representative of the population of listed firms around the globe.

value of the measure (i.e. $AbaccAbs_{it}$). For robustness, we also compute $AbaccAbsMod_{it}$ following Kothari *et al.* (2005) who added the term $+ROA_{it}$ (the firm’s return on assets) to equation 2.

ES measures We use benchmarked environmental and social information. For the main measure, similar to Ioannou and Serafeim (2012) and Lys *et al.* (2015), we construct a composite ES index as the average of the environmental and social pillars. For robustness, we use the two pillars separately. We exclude attributes relating to corporate governance, since they are more disconnected from the notion of environmental and social disclosure (Lys *et al.*, 2015); this is also in line with Ding *et al.* (2021). However, we employ standalone governance, management and ownership characteristics to uncover firm level heterogeneity (as we describe below). To illustrate the content of the ES measure, the environmental pillar is based on information on resource use and emission reduction, and environmentally-related product innovation. The social pillar reflects practices on product responsibility, community, human rights, diversity, training and development, health and safety, and employment.

For the ESG sentiment analysis, we rely on the firm’s representation in the news and social media. Our measures are constructed using natural language processing on a wide range of sources such as news outlets, social media, and other online content. This approach has two advantages; it provides (1) an overall view of ESG sentiment and trends, and (2) an “automatic” machine learning-generated dataset based on big unstructured data thus avoiding rater-schemes’ biases. Specifically, we use an overall measure of the average ESG sentiment during the year and a net measure of the sentiment, which adjusts downwards the ESG sentiment score of a firm which exhibits controversies in the media.

Firm characteristics We control for a series of time-varying firm attributes. For financial controls we include the logarithm of total assets, ROA, the ratio of debt to total assets, and the ratio of cash to total assets. To explore more granular accounting channels of the FRQ - ES substitution effect, we retrieve the firm’s depreciation and amortization expenses,

intangible assets, research and development (R&D) expenses, value of inventories, and labor cost; we scale each of these variables by the value of total assets. We also control for key corporate governance characteristics such as the percentage of independent members on the board of directors, the percentage of women on the board of directors, the number of seats on the board of directors, an indicator taking the value of one if the CEO also holds the chairman of the board position (and zero otherwise), and an indicator taking the value of one if the executives' compensation is linked to long-term objectives (and zero otherwise).

To explore firm-level heterogeneity, we use the firm's governance pillar score (capturing systems and processes in place to ensure that board members and executives act in the best interests of its long term shareholders); the firm's management score (reflecting the firm's commitment and effectiveness towards following best practice corporate governance principles); an indicator which takes the value of one if the CEO's compensation is linked to total shareholder return (and zero otherwise); and a similar indicator capturing whether senior executives' compensation is linked to sustainability targets. We also examine the impact of ownership concentration captured by the percentage of strategic holdings and an indicator of institutional blockholdings (i.e. holdings of at least 5%).

Macroeconomic data To estimate models related to our predictions on the business context and government interventions during Covid-19, we first use data from the Oxford Covid-19 Government Response Tracker. For the main analysis, we use an index of economic measures such as income support and debt relief. We also use an overall index of the intensity of all (not only economic) responses of governments during the pandemic. For both cases, the index varies at country-year during 2020-2021 (and is zero otherwise), with higher values indicating a higher intensity of government interventions. We then add macroeconomic development indicators such as GDP per capita and the strength of legal rights index capturing enforcement in the firm liquidity contracting markets.

Table 1 summarizes all variables and Table A1 provides their complete definitions.

[[Table 1 about here]]

4 Empirical Specifications

Baseline The baseline specification to examine the relationship between ES information and FRQ during the Covid-19 crisis for firm i in period t takes the form:

$$Abacc_{it} = \beta_1 C19 + \beta_2 ES\ score + \beta_3 C19 \times ES\ score + Controls + \eta_i + \gamma_t + \epsilon_{it}, \quad (3)$$

where $Abacc_{it}$ can be the ranked (AbaccRank) or absolute (AbaccAbs) value of abnormal accruals, with higher values indicating lower FRQ (or higher accounting opaqueness). For robustness we also use the absolute values from the modified FRQ model (AbaccAbsMod). C19 is an indicator that takes the value of one for 2020-2021 (the Covid-19 crisis years) and zero for 2017-2019. To explore the FRQ - ES dynamics of the pre- and Covid-19 periods, we replace the C19 indicator with a set of year dummies. We also check the sensitivity of our results to placebo crisis analyses. In the baseline, the ES score enters contemporaneously with the FRQ measure to explore the potentially dynamic substitution effects. We use the average of the environmental and social pillars, and check potentially different results by pillar. Controls include the time-varying financial and governance characteristics described in Section 3. We include firm fixed effects (η_i) to control for unobserved time-constant heterogeneity and year fixed effects (γ_t) to account for time-specific conditions that may affect all firms. Standard errors are double clustered at the firm and country-year level. In line with our predictions we expect β_3 to be positive and significant.

Standard and synthetic difference-in-differences The Covid-19 shock was unexpected, but doubts may exist on whether firms with different pre-Covid-19 ES scores already exhibited diverging trends in FRQ. In the spirit of Lins *et al.* (2017) and Ding *et al.* (2021), we replace the ES score in equation 3 by each of the following three variables. First, we compute

a “High ES” indicator that takes the value of one for all sample years if the firm’s average ES score in the pre-Covid-19 years (i.e. 2017-2019) is above the median of the distribution and zero otherwise. Second, we define “ES Q4 vs. Q1-3” which takes the value of one if the firm’s pre-Covid-19 ES score is in the top quartile of the distribution and zero otherwise. Third, we compute “ES Q4 vs. Q1-2” taking the value of one if the firm’s pre-Covid-19 ES score is in the top quartile of the distribution, and zero if the score is in the bottom two quartiles (excluding firms in the third quartile). For each case, the treatment is the interaction between the C19 dummy and the corresponding higher ES indicator. We check for the fulfilment of the parallel trends assumption by replacing the C19 dummy with year dummies.

To further lower concerns on pre-trends and comparability of firms in the pre-crisis period, we follow [Arkhangelsky *et al.* \(2021\)](#) to implement a synthetic difference-in-differences estimation. In brief, this new method relies on the synthetic control methodology to reweight and match pre-shock trends, thus reducing the reliance on the parallel trend assumption. It uses two way fixed effects (firm and year in our case), requires a balanced panel, and puts more weight on control units that on average were similar in their trends to the treated units.⁶ We implement the synthetic difference-in-differences estimation using a similar specification and variables to the standard case described above.

Government interventions in Covid-19 To test our second prediction, that the ES - FRQ substitution is stronger in contexts with more government intervention (i.e. support to the economy) during the pandemic, we estimate:

$$\begin{aligned}
 Abacc_{it} = & \beta_1 Oxford\ index + \beta_2 ES\ score + \beta_3 Oxford\ index \times ES\ score \\
 & + Controls + \eta_i + \gamma_t + \epsilon_{it},
 \end{aligned}
 \tag{4}$$

⁶Specifically, the synthetic control algorithm uses a nested minimization process to compute the weighted average of all potential control units closest to a treated unit in the pre-Covid-19 period. In this sense, the main distinction with respect to a standard difference-in-differences estimation—which equally weights treated and control firms—is that the synthetic approach relaxes the parallel trends assumption by finding more closely comparable treated and control units.

where the Oxford index is the average number of government interventions to for income support and debt relief defined using data from the Oxford Covid-19 Government Response Tracker. For robustness, we replace this Oxford economic support index with the Oxford overall government response index including all types of government interventions (e.g. including also health-related policies, among other). The other characteristics of equation 4 are the same as in equation 3.

To explore further the heterogeneity behind the government intervention result, we create two matrices of business context categories. First, we interact a high/low Oxford economic indicator with high/low GDP per capita, thus creating four categories of countries. Second, in a similar way, we interact a high/low Oxford economic indicator with high/low strength of legal rights. We then estimate equation 3 on each category of the matrices.

Governance heterogeneity and accounting channels To narrow down on firm-level heterogeneity, we estimate equation 3 splitting the sample between firms with: (i) high vs. low governance score; (ii) high vs. low management score; (iii) CEO’s compensation linked to total shareholder return or not; (iv) the senior executive’s compensation linked to sustainability targets or not; (v) high vs. low strategic holdigns; and (vi) institutional blockholdings or without.⁷

Last, we explore the accounting channels through which changes in FRQ may propagate during Covid-19 by estimating:

$$AccChannel_{it} = \beta_1 C19 + \beta_2 ES\ score + \beta_3 C19 \times ES\ score + Controls + \eta_i + \gamma_t + \epsilon_{it}, \quad (5)$$

where $AccChannel_{it}$ is sequentially the ratio of the following variables to total assets: depreciation and amortization (DeprAmt_TA), intangible assets (Intang_TA), R&D expenses (R&D_TA), value of inventories (Invent_TA), and labor cost (Labor_TA). The other charac-

⁷The high vs. low sub-samples are defined as above vs. below the median of the corresponding variable’s distribution.

teristics of equation 5 are the same as in equation 3.

5 Results

5.1 ES Information and FRQ during Covid-19

Baseline results Table 2 presents the baseline estimations on the relationship between ES information and FRQ during Covid-19. Following equation 3, we start with a specification that includes the interaction terms of interest, and controls for time-varying firm financial characteristics and unobserved heterogeneity using firm fixed effects in columns 1-2. Results show that for both ranked and absolute measures of abnormal accruals, there is an indication of a substitution effect between ES and financial information, with higher ES levels positively and significantly related to lower FRQ (or higher accounting opaqueness).

To illustrate this effect, Figure 1 plots the coefficients corresponding to the term “C19 $\times$ ES score” in column 2 of Table 2 alongside 95% confidence intervals, for the pre- (left panel) and Covid-19 (right panel) periods. The lower part of the figure shows that the distribution of ES scores is similar between the two periods. While the figure and table estimates indicate a potential positive role of ES for FRQ before the crisis, this result is not robust to the different measures accounting opaqueness. Next, columns 3-4 of Table 2 show that our results remain unchanged when adding time-varying firm governance characteristics and year fixed effects. Importantly, when replacing the crisis dummy with a set of year effects (omitting the first year of the sample), we find that the significant effect of ES scores on FRQ appears only during Covid-19.

[[Table 2 and Figure 1 about here]]

We run an additional set of robustness checks presented in Table A2. In columns 1-2 we find the same results using as dependent variables the rank or level of abnormal accruals

from the modified model.⁸ In columns 3-6 we corroborate that the ES - FRQ substitution effect holds when using the environmental and social scores separately.⁹ We further confirm that our results are driven by the Covid-19 shock. In Table A3, we find insignificant effects when we define a placebo-Covid-19 dummy which takes the value of one for year 2018 and zero otherwise.

Results from (synthetic) difference-in-differences To reduce concerns about potential endogeneity in the cross-section, as well as pre-Covid-19 trends, we implement a series of difference-in-difference estimations which we report in Table 3. Here we use the firm’s average ES score in the pre-Covid-19 period and define whether the firm pertains to the top two quartiles (above the median) of the distribution (High ES), to the top quartile and compare to the rest of firms (ES Q4 vs. Q1-3), and to the top quartile and compare to the bottom two quartiles (ES Q4 vs. Q1-2). Across all specifications and for both standard (columns 1-6) and synthetic (columns 7-12) difference-in-difference estimations we find that higher pre-crisis ES scores are related to lower FRQ (or higher accounting opaqueness) during Covid-19.¹⁰

While the synthetic difference-in-differences estimator has the advantage of reducing the pre-trends problem, this problem may still occur with a higher probability in standard estimations. To estimate pre-trends, we replace the C19 dummy in columns 2 and 8 of Table 3 with a set of year dummies (using 2017 as a reference year), and maintaining the complete set of controls and fixed effects. Figures 2 (for standard difference-in-differences) and A1 (for the synthetic approach) illustrate the obtained year $\times$ High ES coefficients alongside

⁸In untabulated checks we confirm that our results hold when adding the terms $C19 \times ROA$ and $C19 \times \ln TA$ to the specifications in columns 3-4 of Table 2. In addition, results do not change if we add industry $\times$ year fixed effects, or if we cluster standard errors at the country-year and industry-year level.

⁹The correlation between the two pillars in the cross-section is 0.74, impeding their joint estimation in a single regression.

¹⁰The synthetic difference-in-differences estimations include fewer observations due to requiring a balanced panel throughout the sample period and reweighting and adjusting pre-shock trends. The results are robust to starting the estimation period in 2017, as reported, or starting in 2018. The drop in observations is partially caused by missing ES information in year 2017, while the financial information used for computing FRQ (benchmarked in the population of listed firms) is available in a close-to-balanced panel.

95% confidence intervals. The effects are not different from zero in the pre-crisis period, and become and remain significant in the Covid-19 period.¹¹ Altogether, the evidence substantially reduces concerns on potentially diverging pre-trends and supports our prediction that higher ES firms exhibit lower FRQ during the Covid-19 crisis.

[[Table 3 and Figure 2 about here]]

5.2 The Role of Government Interventions

Our second prediction posits that a potential substitution effect between ES and FRQ information signals is stronger in contexts with a higher intensity of government economic support during Covid-19. We test this prediction in Table 4 by interacting the Oxford economic support index (whose higher levels indicate more government-mandated income support and debt relief during the pandemic) with the ES score (see equation 4). We control for the full set of time-varying firm financial and governance characteristics, firm fixed effects (across all columns) and year effects (in columns 3-4). The results confirm the baseline estimates, showing a positive link between ES scores and accounting opaqueness during crisis times. But, importantly, such link becomes stronger when the government substitutes market-based mechanisms with state-mandated policies for allocating resources to firms; this arguably reduces the necessity of signaling to market participants through FRQ. This result is robust to using the Oxford index for economic support, as well as the overall index of government intervention across all types of policies (see Table A4).

[[Table 4 about here]]

But is the substitution of ES - FRQ signals equally strong across different types of business contexts featuring distinct levels of government intervention? Our conjecture is that more government intervention facilitates such substitution, but that the effect will be stronger

¹¹Note also that the studied effect does not appear in 2019, which was not economically affected by the Covid-19 shock but whose firm-level financial information was largely made available during 2020.

when firms have both the ability and incentives to substitute signals. A higher intensity of government interventions enables firms to lower FRQ by muting market mechanisms, while higher ES can provide the incentives when stakeholders (such as clients) are more sophisticated and respond to social capital signals. Table 5 provides a test of this prediction by creating a matrix that splits the sample by high/low government economic support $\times$ GDP per capita (a proxy of richness and stakeholder sophistication).

Consistent with our theoretical prior, we find that the result is stronger for firms acting in rich business contexts that featured high government support during Covid-19 (column 1). These are countries such as Italy, Spain, the US and the UK, as opposed to countries such as Sweden or Switzerland which are rich but had lower levels of government income support and debt relief during the pandemic (column 3). In columns 5-6, we show that this result is robust to excluding the US and the UK, the most populated stock markets in the sample. In an untabulated check we also corroborate that results hold when keeping only firms located in the US and UK, in which investors may hold more critical views on ES activities (Brandon *et al.*, 2022).

Next, we explore whether the effect also depends on the level of enforcement of laws protecting contracts (e.g. on market-based financing), which may hold an increased importance in a crisis. Results in Table A5 first show that the ES - FRQ substitution during Covid-19 is more pronounced in high intervention $\times$ high legal rights contexts. However, this effect is driven by the US and UK, and disappears when these countries are removed from the estimation (columns 5-6). The effect remains present with relatively higher economic support during Covid-19 and lower strength of legal rights (for the particular case of protecting borrowers and lenders), in countries such as Italy, Portugal and Spain (column 2). Taken together, the results in this section provide strong support to our nuanced prediction on the ES and FRQ signals in markets with distinct pre-Covid-19 economic development and institutional features, which were exposed to different levels of economic support during the pandemic.

[[Table 5 about here]]

5.3 Governance Heterogeneity and Accounting Channels

Does the ES - FRQ substitution effect depend on firm governance characteristics? To address this question, we rerun our baseline estimations splitting the sample by firm characteristics capturing governance and management practices (which may affect monitoring effectiveness) and senior executives' compensation structure (which may influence incentives to monitor). The findings in columns 1-2 of Table 6 show that the ES - FRQ substitution during Covid-19 occurs in firms with a lower quality of governance mechanisms protecting long term shareholder value. Similarly, it is present in firms with a lower management effectiveness (columns 3-4). Moving to the incentives to monitor, columns 5-8 illustrate that the Covid-19 $\times$ ES score leads to higher accounting opaqueness when the CEO pay is not linked to shareholder return, and when there is no link of senior executives' pay to sustainability targets. Finally, monitoring also varies with the presence of strategic owners. The substitution effect is stronger in firms with lower percentages of strategic holdings (ownership concentration) and without institutional blockholdings, which otherwise dampen the effect (columns 9-12).

[[Table 6 about here]]

Through what accounting channels do the governance shortcomings for long-term shareholder value in higher ES firms propagate? We investigate this question in Table 7 following the general specification in equation 5. We show that, with respect to pre-Covid-19 years, higher ES firms display more variation in depreciation and amortization expenses (column 1), the capitalization of intangible assets (column 2), R&D expenses (column 3), value of inventories (column 4), and labor cost (column 5). These results support that higher ES firms exhibit higher variability of accrual components between good and bad economic times, increasing the subjectivity of their accounting information during the Covid-19 crisis.

[[Table 7 about here]]

5.4 Sentiment Analysis

Do our results change when using automatically generated data rather than information gathering schemes designed by human analysts? To examine this question, we replace the ES score in equation 3 with machine learning-generated sentiment from a large set of news, social media, and other online content. Column 1 of Table 8 shows that our findings are robust to using an overall measure of the ESG sentiment during a given year. They are also robust to correcting the sentiment measure for the presence of firm-level controversies, rather than just considering tone (column 2). Next, in columns 3 and 4 we use the overall and net measures of ESG sentiment, respectively, to support our main results on the role of government interventions (see equation 4).

Since the algorithm-generated data are available for a larger number of firms, in Table A6 we are able to validate our baseline results on a sample of over 14,000 firms. However, we refrain from extending the analysis on this sample, for which we cannot control for or explore heterogeneity by detailed firm governance and ownership characteristics. Overall, the ESG sentiment analysis adds confidence to our results based on more standard ES information and governance characteristics, which given their definitions are naturally closer to empirically test the study’s predictions.

[[Table 8 about here]]

6 Conclusions

Accounting and financial economics scholars are preoccupied with the use and quality of information during times of crisis. While financial economists have argued that market participants may suffer from information depletion (Asriyan *et al.*, 2022), accounting scholars are concerned with a lower quality of information disclosure in financial (Bischof *et al.*, 2020) and Covid-19 (deHaan *et al.*, 2023) crises.

We argue and show that firms with higher (pre-Covid-19) ES levels lowered their FRQ

(increased accounting opaqueness) during the pandemic-induced market uncertainty. An economic mechanism at play behind the ES - FRQ substitution effect is the change in the signaling values of financial and non-financial information. High ES firms can signal trust to stakeholders, a type of social capital particularly important in a crisis. This enables firms to wait for the crisis to unravel before disclosing accurate accounting information, which is also less useful in a crisis of a non-financial nature and with non-market liquidity support. Indeed, we predict and show that the ES - FRQ signal substitution occurs especially in contexts with more government interventions to support the economy. Interestingly, firms rely more on the ES signal and increase accounting opaqueness during Covid-19 when the intensity of income support and debt relief is high and the business context (i) is rich (i.e. with sophisticated stakeholders responding to ES information), or (ii) features a low enforcement of legal rights in market liquidity contracts.

Firm level conditions are important. We show that firms displaying both high ES and more effective internal monitoring and incentive mechanisms towards shareholder value do not increase accounting opaqueness during the Covid-19 crisis. The ES - FRQ substitution effect is present mostly for firms with worse governance and management systems (i.e. in the absence of effective systems and practices to protect the long-term interests of shareholders), and for firms in which the CEO pay is not linked to shareholder return or the executives' pay to sustainability targets. It is also stronger when ownership concentration is low and in the absence of institutional blockholdings, which otherwise alleviate the effect. The laxer monitoring is transmitted via accounting channels. During the pandemic, higher ES firms increase the subjectivity (variability) in key components such as depreciation and amortization expenses, the capitalization of intangible assets, R&D expenses, value of inventories, and labor cost.

Overall, our findings relate to long-standing debates on firms' incentives to alter financial reporting ([Graham *et al.*, 2005](#)), the mixed results on the ES - FRQ relationship, and the shortcomings of integrated reporting of financial and non-financial information ([Bucaro](#)

et al., 2020; Wu and Zhou, 2022). The results in our work link to current debates of the Securities and Exchange Commission (see Cunningham *et al.* 2022) and recent EU directives on mandatory ES reporting. But our findings also raise caution on mandating integrated reporting, which may actually facilitate information substitution effects. The willingness and ability of firms to substitute types of information signals are particularly important in a crisis featuring economic support and potential externalities from the relaxation of accounting policies (see Leuz and Wysocki 2016). Our work shows that the otherwise balanced scorecard of financial and non-financial information became opaque and rather unbalanced during the Covid-19 crisis.

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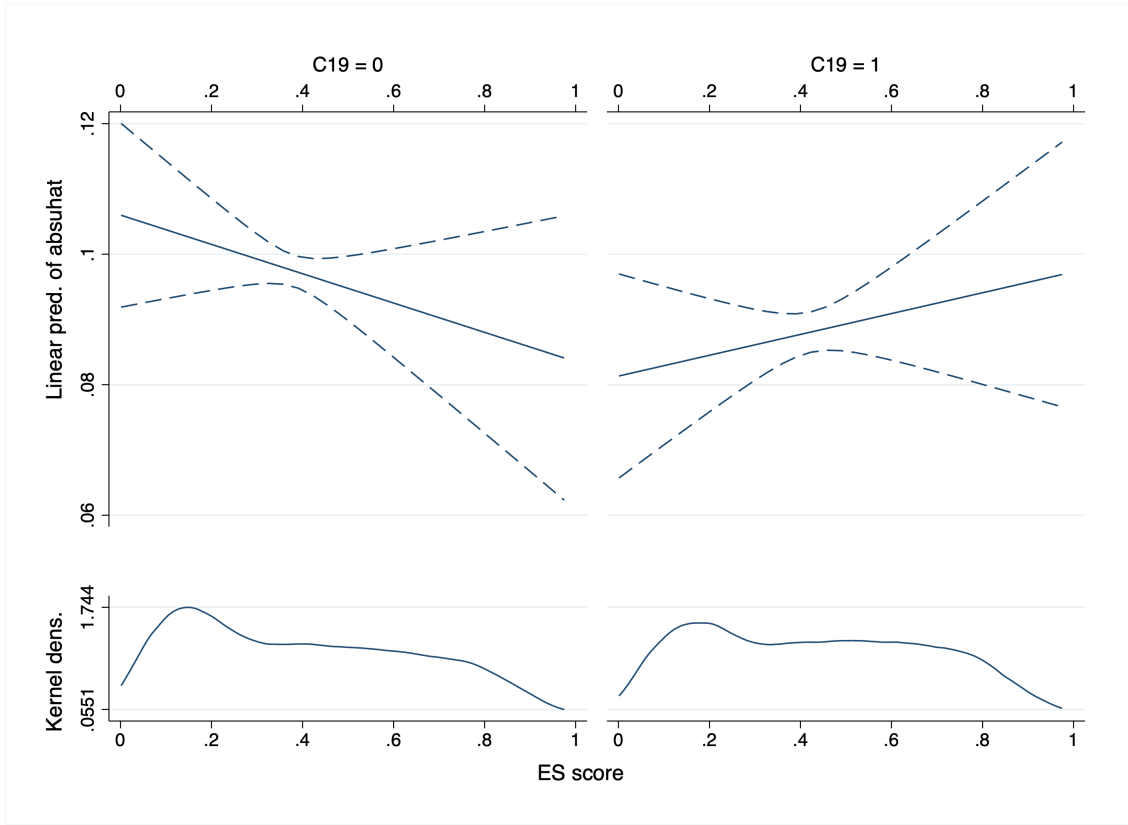
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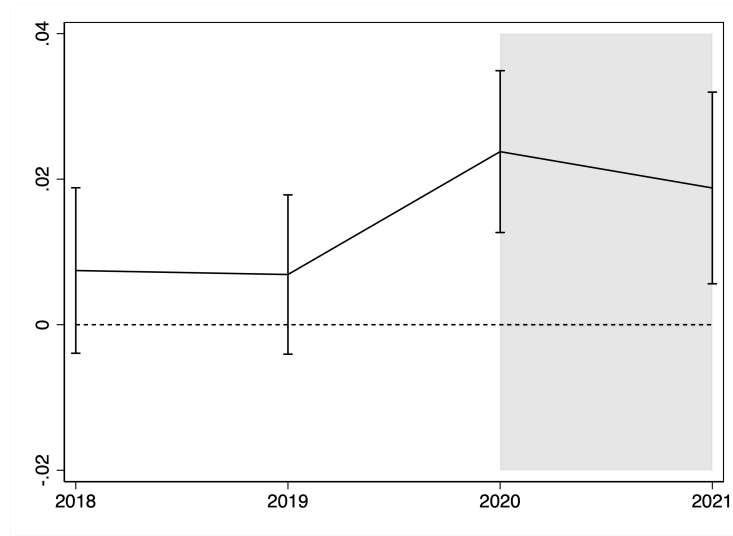
FIGURES AND TABLES

Figure 1: ES Scores and FRQ pre- and during Covid-19



Notes: This figure plots the coefficients corresponding to the term “C19 $\times$ ES score” in column 2 of Table 2 alongside 95% confidence intervals, for the pre- (left panel) and Covid-19 (right panel) periods.

Figure 2: The Effect of pre-Covid-19 High ES on FRQ during the Crisis



Notes: This graph illustrates the coefficients and 95% confidence intervals of the interaction between a set of year dummies (using 2017 as a reference year) and a “High ES” indicator. The “High ES” indicator takes the value of one for each firm for all sample years if the firm-level average of ES in the pre-Covid-19 period (2017-2019) is above the sample median, and zero otherwise. The dependent variable is AbaccAbs and the control variables and fixed effects are as in column 6 of Table 2.

Table 1: Descriptive Statistics

Variable name	Obs	Mean	Std. dev.	Median
Financial reporting quality (FRQ)				
AbaccRank	28,392	0.426	0.268	0.404
AbaccAbs	28,392	0.093	0.142	0.053
Environmental and social (ES)				
ES score	28,392	0.413	0.247	0.394
Environmental score	28,392	0.363	0.286	0.345
Social score	28,392	0.463	0.242	0.451
Overall ESG sentiment	21,470	0.524	0.174	0.517
Net ESG sentiment	21,470	0.456	0.153	0.453
Firm financials				
lnTA	28,392	14.640	1.717	14.729
ROA	28,392	0.050	0.237	0.066
Debt_TA	28,392	0.307	0.252	0.267
Cash_TA	28,392	0.172	0.182	0.108
DeprAmt_TA	28,392	0.044	0.039	0.037
Intang_TA	25,857	0.250	0.400	0.126
R&D_TA	11,608	0.089	0.182	0.032
Invent_TA	24,371	0.138	0.199	0.096
Labor_TA	18,091	0.150	0.211	0.091
Governance				
Board independence	28,375	59.163	24.809	60.000
Board gender diversity	28,369	50.396	28.288	50.396
Board size	28,375	9.114	2.869	9.000
CEO duality	28,392	0.341	0.474	0.000
Exec. comp. LT obj.	28,392	0.095	0.293	0.000
Governance score	28,392	0.504	0.223	0.508
Management score	28,392	0.525	0.280	0.532
CEO link SH return	28,392	0.440	0.496	0.000
Exec. comp. susty. targets	28,392	0.167	0.373	0.000
Strategic holdings	28,000	28.041	26.469	20.327
Institutional blockholdings indicator	28,392	0.339	0.473	0.000
Covid-19 variables				
C19	28,392	0.459	0.498	0.000
Oxford econ. index	28,351	23.925	28.729	0.000
Oxford overall index	28,351	25.364	28.136	0.000

Notes: Summary statistics for selected variables in the regression sample. See complete variable definitions in Table A1.

Table 2: **ES Scores and FRQ during Covid-19**

Dep. var.:	(1) AbaccRank	(2) AbaccAbs	(3) AbaccRank	(4) AbaccAbs	(5) AbaccRank	(6) AbaccAbs
C19	-0.0085 (0.010)	-0.0247*** (0.005)				
ES score	-0.0585* (0.034)	-0.0225 (0.019)	-0.0353 (0.030)	-0.0124 (0.018)	-0.0286 (0.035)	-0.0191 (0.022)
C19 × ES score	0.0532*** (0.015)	0.0384*** (0.007)	0.0588*** (0.015)	0.0372*** (0.008)		
2018 × ES score					0.0021 (0.019)	0.0097 (0.013)
2019 × ES score					-0.0206 (0.021)	0.0095 (0.013)
2020 × ES score					0.0491** (0.023)	0.0466*** (0.014)
2021 × ES score					0.0520** (0.025)	0.0419*** (0.015)
Observations	28,392	28,392	28,364	28,364	28,364	28,364
R^2	0.392	0.403	0.394	0.404	0.394	0.404
Firm financial controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm governance controls			Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE			Yes	Yes	Yes	Yes

Notes: The dependent variable is specified at the top of each column. Firm financial controls are: lnTA, ROA, debt_TA, and cash_TA. Firm governance controls are: board independence, board gender diversity, board size, CEO duality, and exec. comp. LT obj. Standard errors are reported in parentheses and are clustered at the firm and country-year level. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level. See Table 1 for descriptive statistics of the variables, and Table A1 for their complete definitions.

Table 3: The Effect of Pre-Covid-19 ES on FRQ in Crisis-Times

Dep. var.:	(1) AbaccRank	(2) AbaccAbs	(3) AbaccRank	(4) AbaccAbs	(5) AbaccRank	(6) AbaccAbs
Difference-in-differences						
C19 × High ES	0.0236*** (0.008)	0.0161*** (0.004)				
C19 × ES Q4 vs. Q1-3			0.0264*** (0.009)	0.0141*** (0.004)		
C19 × ES Q4 vs. Q1-2					0.0307*** (0.010)	0.0183*** (0.005)
Observations	26,517	26,517	26,517	26,517	19,650	19,650
R^2	0.373	0.378	0.373	0.378	0.383	0.391
Synthetic difference-in-differences						
C19 × High ES	0.0207** (0.008)	0.0149*** (0.004)				
C19 × ES Q4 vs. Q1-3			0.0248** (0.010)	0.0143*** (0.004)		
C19 × ES Q4 vs. Q1-2					0.0281** (0.012)	0.0175*** (0.005)
Observations	14,830	14,830	14,830	14,830	11,120	11,120
Firm financial controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm governance controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The dependent variable is specified at the top of each column. High ES takes the value of one for all sample years if the firm's average ES score in the pre-Covid-19 years (i.e. 2017-2019) is above the median of the distribution and zero otherwise. ES Q4 vs. Q1-3 takes the value of one if the firm's pre-Covid-19 ES score is in the top quartile of the distribution and zero otherwise. ES Q4 vs. Q1-2 takes the value of one if the firm's pre-Covid-19 ES score is in the top quartile if the distribution, and zero if the score is in the bottom two quartiles (excluding firms in the third quartile). Firm financial controls are: lnTA, ROA, debt_TA, and cash_TA. Firm governance controls are: board independence, board gender diversity, board size, CEO duality, and exec. comp. LT obj. Standard errors are reported in parentheses and are clustered at the firm and country-year level. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level. See Table 1 for descriptive statistics of the variables, and Table A1 for their complete definitions.

Table 4: **The Role of Government Interventions**

Dep. var.:	(1) AbaccRank	(2) AbaccAbs	(3) AbaccRank	(4) AbaccAbs
Oxford econ. index	-0.0001 (0.000)	-0.0004*** (0.000)	-0.0003 (0.000)	-0.0002* (0.000)
ES score	-0.0448 (0.034)	-0.0218 (0.019)	-0.0293 (0.030)	-0.0080 (0.018)
Oxford econ. index $\times$ ES score	0.0008*** (0.000)	0.0006*** (0.000)	0.0009*** (0.000)	0.0006*** (0.000)
Observations	28,319	28,319	28,319	28,319
R^2	0.392	0.403	0.394	0.404
Firm financial controls	Yes	Yes	Yes	Yes
Firm governance controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE			Yes	Yes

Notes: The dependent variable is specified at the top of each column. Firm financial controls are: lnTA, ROA, debt_TA, and cash_TA. Firm governance controls are: board independence, board gender diversity, board size, CEO duality, and exec. comp. LT obj. Standard errors are reported in parentheses and are clustered at the firm and country-year level. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level. See Table 1 for descriptive statistics of the variables, and Table A1 for their complete definitions.

Table 5: **Heterogeneous Effects of Government Interventions**

Dep. var.: AbaccRank Sample:	(1) HOx_HGDP	(2) HOx_LGDP	(3) LOx_HGDP	(4) LOx_LGDP	(5) (1) no US	(6) (1) no US&UK
ES score	-0.0372 (0.043)	0.0503 (0.077)	-0.0318 (0.089)	-0.0442 (0.058)	-0.1256** (0.048)	-0.1461*** (0.052)
C19 $\times$ ES score	0.0604*** (0.018)	0.0550 (0.062)	0.0002 (0.048)	0.0369 (0.045)	0.0630** (0.025)	0.0629** (0.026)
Observations	18,144	2,171	3,194	4,149	9,003	7,586
R^2	0.385	0.366	0.417	0.445	0.396	0.405
Firm financial controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm governance controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The dependent variable is AbaccRank. HOx_HGDP: High Oxford econ. index $\times$ High GDP per capita; HOx_LGDP: High Oxford econ. index $\times$ Low GDP per capita; LOx_HGDP: Low Oxford econ. index $\times$ High GDP per capita; LOx_LGDP: Low Oxford econ. index $\times$ Low GDP per capita. Firm financial controls are: lnTA, ROA, debt_TA, and cash_TA. Firm governance controls are: board independence, board gender diversity, board size, CEO duality, and exec. comp. LT obj. Standard errors are reported in parentheses and are clustered at the firm and country-year level. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level. See Table 1 for descriptive statistics of the variables, and Table A1 for their complete definitions.

Table 6: **Firm Governance Heterogeneity**

Dep. var.: AbaccRank Sample:	(1) HGovscore	(2) LGovscore	(3) HManagscore	(4) LManagscore
ES score	-0.1181*** (0.044)	0.0210 (0.047)	-0.0986** (0.046)	0.0127 (0.043)
C19 $\times$ ES score	0.0210 (0.026)	0.0701*** (0.026)	0.0184 (0.025)	0.0953*** (0.024)
Observations	13,897	12,510	13,825	12,570
R^2	0.406	0.456	0.408	0.459
	(5) CEOShReturn	(6) noCEOShReturn	(7) ComplinkSusty	(8) noComplinkSusty
ES score	-0.0023 (0.052)	-0.0506 (0.035)	-0.0361 (0.088)	-0.0259 (0.033)
C19 $\times$ ES score	0.0336* (0.020)	0.0827*** (0.021)	-0.0930 (0.057)	0.0673*** (0.016)
Observations	11,936	15,260	3,992	23,161
R^2	0.409	0.439	0.450	0.415
	(9) HOwnConc	(10) LOwnConc	(11) InstitBlockhld	(12) noInstitBlockhld
ES score	-0.0446 (0.040)	-0.0315 (0.042)	0.0568 (0.054)	-0.0937*** (0.031)
C19 $\times$ ES score	0.0334 (0.021)	0.0702*** (0.020)	0.0402 (0.025)	0.0678*** (0.019)
Observations	13,610	13,697	9,623	18,741
R^2	0.420	0.388	0.376	0.405
Firm financial controls	Yes	Yes	Yes	Yes
Firm governance controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Notes: The dependent variable is AbaccRank. The sample in each regression is specified at the top of each column. Firm financial controls are: lnTA, ROA, debt_TA, and cash_TA. Firm governance controls are: board independence, board gender diversity, board size, CEO duality, and exec. comp. LT obj. Standard errors are reported in parentheses and are clustered at the firm and country-year level. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level. See Table 1 for descriptive statistics of the variables, and Table A1 for their complete definitions.

Table 7: **Accounting Channels**

Dep. var.:	(1) DeprAmt_TA	(2) Intang_TA	(3) R&D_TA	(4) Invent_TA	(5) Labor_TA
ES score	-0.0119** (0.006)	-0.1020*** (0.031)	-0.0117 (0.014)	-0.0156 (0.017)	-0.0280 (0.017)
C19 $\times$ ES score	0.0039* (0.002)	0.1002*** (0.019)	0.0446*** (0.012)	0.0174*** (0.005)	0.0195** (0.010)
Observations	28,364	26,298	12,418	24,599	18,383
R^2	0.712	0.741	0.922	0.854	0.834
Firm financial controls	Yes	Yes	Yes	Yes	Yes
Firm governance controls	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes

Notes: The dependent variable is specified at the top of each column. Firm financial controls are: lnTA, ROA, debt_TA, and cash_TA. Firm governance controls are: board independence, board gender diversity, board size, CEO duality, and exec. comp. LT obj. Standard errors are reported in parentheses and are clustered at the firm and country-year level. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level. See Table 1 for descriptive statistics of the variables, and Table A1 for their complete definitions.

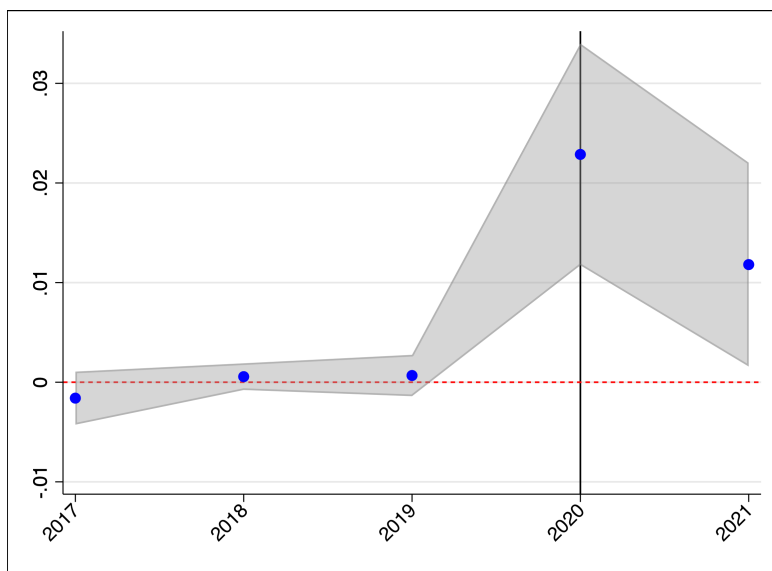
Table 8: **Sentiment Analysis**

Dep. var.: AbaccRank	(1)	(2)	(3)	(4)
C19:	Indicator	Indicator	Oxford	Oxford
ESG sentiment:	Overall	Net	Overall	Net
ESG sentiment	0.0153 (0.027)	-0.0033 (0.032)	0.0190 (0.026)	0.0015 (0.031)
C19 $\times$ ESG sentiment	0.0432* (0.024)	0.0634** (0.029)	0.0007* (0.000)	0.0010** (0.000)
Observations	21,470	21,470	21,438	21,438
R^2	0.383	0.383	0.384	0.384
Firm financial controls	Yes	Yes	Yes	Yes
Firm governance controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Notes: The dependent variable is AbaccRank. The C19 variable definition is indicated at the top of each column, and can be the C19 dummy or the Oxford econ. index. The ESG sentiment indicated at the top of each column can be based on the overall or net measures. Firm financial controls are: lnTA, ROA, debt_TA, and cash_TA. Firm governance controls are: board independence, board gender diversity, board size, CEO duality, and exec. comp. LT obj. Standard errors are reported in parentheses and are clustered at the firm and country-year level. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level. See Table 1 for descriptive statistics of the variables, and Table A1 for their complete definitions.

INTERNET APPENDIX

Figure A1: **The Effect of Pre-Covid-19 High ES on FRQ during the Crisis: Synthetic Difference-in-Differences Estimations**



Notes: This graph illustrates the yearly point estimates alongside 95% confidence intervals from the synthetic difference-in-differences model in column 8 of Table 3.

Table A1: Variable Definitions

Variable name	Definition
Financial reporting quality (FRQ)	
AbaccRank	The percentile rank of the absolute value of abnormal accruals, as per equations 1 and 2.
AbaccAbs	The absolute value of abnormal accruals, as per equations 1 and 2.
AbaccAbsMod	The absolute value of abnormal accruals, as per equation 1 and the modified equation 2.
Environmental and social (ES)	
ES score	The average value of the benchmarked environmental and social pillars' scores.
Environmental score	Benchmarked score reflecting the firm's information on resource use and emission reduction, and environmentally-related product innovation.
Social score	Benchmarked score reflecting the firm's practices on product responsibility, community, human rights, diversity, training and development, health and safety, and employment.
High ES	An indicator that takes the value of one for all sample years if the firm's average ES score in the pre-Covid-19 years (i.e. 2017-2019) is above the median of the distribution and zero otherwise.
ES Q4 vs. Q1-3	An indicator that takes the value of one for all sample years if the firm's average ES score in the pre-Covid-19 years (i.e. 2017-2019) is in the top quartile of the distribution and zero otherwise.
ES Q4 vs. Q1-2	An indicator that takes the value of one for all sample years if the firm's average ES score in the pre-Covid-19 years (i.e. 2017-2019) is in the top quartile of the distribution and zero if the score is in the bottom two quartiles (excluding firms in the third quartile).
Overall ESG sentiment	Overall measure of the news, social media and other online content ESG sentiment during the year.
Net ESG sentiment	Net measure of the news, social media and other online content ESG sentiment during the year, which adjusts downwards the overall ESG sentiment score of a firm which exhibits controversies in the media.
Firm financials	
lnTA	The natural logarithm of total assets.
ROA	Return on assets defined as earnings before interests and taxes (EBIT) divided by the lag value of total assets.
Debt_TA	Total debt divided by total assets.
Cash_TA	Cash and cash equivalents divided by total assets.
DeprAmt_TA	Depreciation and amortization divided by the lag value of total assets.
Intang_TA	Intangible assets divided by the lag value of total assets.
R&D_TA	Research and development expenses divided by the lag value of total assets.
Invent_TA	The value of inventories divided by the lag value of total assets.
Labor_TA	Labor cost divided by the lag value of total assets.
Other financials for FRQ	
Current assets	The value of the firm's current assets.
Cash and cash equivalents	The value of the firm's cash and cash equivalents.
Current liabilities	The value of the firm's current liabilities.
Short term debt	The value of the firm's short term debt.
Income taxes	Income taxes payable for the period.
Depreciation and amortization	The value of the firm's depreciation and amortization expenses.
Revenues	Total revenues from business activities.
Accounts receivables	The value of account receivables.
Property plant and equipment	The value of property, plant and equipment.
Governance	
Board independence	The percentage of independent members on the board of directors.
Board gender diversity	The percentage of women on the board of directors.
Board size	The number of seats on the board of directors.
CEO duality	An indicator taking the value of one if the CEO and chairman of the board positions are held by the same person and zero otherwise.
Exec. comp. LT obj.	An indicator taking the value of one if the executives' compensation is linked to long-term objectives and zero otherwise.
Governance score	Benchmarked score reflecting the firm's systems and processes in place to ensure that board members and executives act in the best interests of its long term shareholders.
Management score	Benchmarked score reflecting the firm's commitment and effectiveness towards following best practice corporate governance principles.
CEO link SH return	An indicator taking the value of one if the CEO's compensation is linked to total shareholder return and zero otherwise.
Exec. comp. susty. targets	An indicator taking the value of one if the senior executives' compensation is linked to sustainability targets and zero otherwise.
Strategic holdings	The percentage of strategic holdings (ownership concentration) defined as 100 minus the free float as a percentage of traded shares.
Institutional blockholdings indicator	Indicator that takes the value of one if the institutional ownership percentage is at least 5% for the primary share issue calculated by taking the latest ownership record for each fund reported in the last two years, summing them, and then dividing the sum by the total primary shares outstanding. Static datapoint that if such information is missing takes the value of zero.
Macroeconomic variables	
C19	An indicator that takes the value of one for 2020-2021 (the Covid-19 crisis years) and zero for 2017-2019.
Oxford econ. index	Index reflecting the intensity of government measures such as income support and debt relief introduced during 2020 and 2021. Data retrieved from the Oxford Covid-19 Government Response Tracker.
Oxford overall index	Index reflecting the intensity of government measures on all economic and social aspects introduced during 2020 and 2021. Data retrieved from the Oxford Covid-19 Government Response Tracker.
GDP per capita	A country's gross domestic product per capita.
Strength of legal rights	Index reflecting the degree to which country-level laws protect the rights of borrowers and lenders and thus facilitating access to credit.

Notes: See Table 1 for descriptive statistics. The financial accounting variables are winsorized at 1% and 99%.

Table A2: Robustness Checks on Baseline Estimations

Dep. var.:	(1) AbaccAbsMod	(2) AbaccAbsMod	(3) AbaccRank	(4) AbaccAbs	(5) AbaccRank	(6) AbaccAbs
ES score	-0.0199 (0.023)	-0.0185 (0.024)				
C19 $\times$ ES score	0.0417*** (0.011)	0.0413*** (0.011)				
Social score			-0.0394 (0.025)	-0.0140 (0.016)		
C19 $\times$ Social score			0.0723*** (0.016)	0.0342*** (0.008)		
Environmental score					-0.0218 (0.026)	-0.0095 (0.013)
C19 $\times$ Environmental score					0.0361** (0.014)	0.0308*** (0.007)
Observations	28,370	28,343	28,364	28,364	28,364	28,364
R^2	0.392	0.392	0.394	0.403	0.393	0.404
Firm financial controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm governance controls		Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The dependent variable is specified at the top of each column. Firm financial controls are: lnTA, ROA, debt_TA, and cash_TA. Firm governance controls are: board independence, board gender diversity, board size, CEO duality, and exec. comp. LT obj. Standard errors are reported in parentheses and are clustered at the firm and country-year level. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level. See Table 1 for descriptive statistics of the variables, and Table A1 for their complete definitions.

Table A3: **Placebo Covid-19**

Dep. var.:	(1) AbaccRank	(2) AbaccAbs
ES score	-0.0096 (0.030)	0.0048 (0.018)
Placebo C19 $\times$ ES score	-0.0151 (0.015)	-0.0138 (0.009)
Observations	28,392	28,392
R^2	0.393	0.403
Firm financial controls	Yes	Yes
Firm governance controls	Yes	Yes
Firm FE	Yes	Yes
Year FE	Yes	Yes

Notes: The dependent variable is specified at the top of each column. Firm financial controls are: lnTA, ROA, debt_TA, and cash_TA. Firm governance controls are: board independence, board gender diversity, board size, CEO duality, and exec. comp. LT obj. Standard errors are reported in parentheses and are clustered at the firm and country-year level. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level. See Table 1 for descriptive statistics of the variables, and Table A1 for their complete definitions.

Table A4: The Role of Government Interventions: Robustness Checks

Dep. var.:	(1) AbaccRank	(2) AbaccAbs	(3) AbaccRank	(4) AbaccAbs
Oxford overall index	-0.0002 (0.000)	-0.0004*** (0.000)	-0.0018*** (0.001)	-0.0008*** (0.000)
ES score	-0.0454 (0.035)	-0.0200 (0.019)	-0.0288 (0.030)	-0.0099 (0.018)
Oxford overall index $\times$ ES score	0.0009*** (0.000)	0.0007*** (0.000)	0.0010*** (0.000)	0.0007*** (0.000)
Observations	28,319	28,319	28,319	28,319
R^2	0.392	0.403	0.394	0.404
Firm financial controls	Yes	Yes	Yes	Yes
Firm governance controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE			Yes	Yes

Notes: The dependent variable is specified at the top of each column. Firm financial controls are: lnTA, ROA, debt_TA, and cash_TA. Firm governance controls are: board independence, board gender diversity, board size, CEO duality, and exec. comp. LT obj. Standard errors are reported in parentheses and are clustered at the firm and country-year level. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level. See Table 1 for descriptive statistics of the variables, and Table A1 for their complete definitions.

Table A5: **Heterogeneous Effects of Government Interventions: Legal Rights**

Dep. var.: AbaccRank Sample:	(1) HOx_HLeg	(2) HOx_LLeg	(3) LOx_HLeg	(4) LOx_LLeg	(5) (1) no US	(6) (1) no US&UK
ES score	-0.0320 (0.041)	-0.0557 (0.072)	0.1077 (0.087)	-0.1354* (0.069)	-0.0487 (0.060)	-0.0657 (0.069)
C19 $\times$ ES score	0.0567*** (0.021)	0.0684* (0.037)	-0.0245 (0.051)	0.0156 (0.044)	0.0533 (0.038)	0.0528 (0.044)
Observations	13,397	3,417	2,639	3,131	6,112	4,695
R^2	0.413	0.375	0.431	0.469	0.415	0.433
Firm financial controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm governance controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The dependent variable is AbaccRank. HOx_HLeg: High Oxford econ. index $\times$ High Strength of legal rights; HOx_LLeg: High Oxford econ. index $\times$ Low Strength of legal rights; LOx_HLeg: Low Oxford econ. index $\times$ High Strength of legal rights; LOx_LLeg: Low Oxford econ. index $\times$ Low Strength of legal rights. Firm financial controls are: lnTA, ROA, debt_TA, and cash_TA. Firm governance controls are: board independence, board gender diversity, board size, CEO duality, and exec. comp. LT obj. Standard errors are reported in parentheses and are clustered at the firm and country-year level. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level. See Table 1 for descriptive statistics of the variables, and Table A1 for their complete definitions.

Table A6: **Sentiment Analysis: Robustness to a Larger Sample**

Dep. var.: AbaccRank	(1)	(2)	(3)	(4)
C19:	Indicator	Indicator	Oxford	Oxford
ESG sentiment:	Overall	Net	Overall	Net
ESG sentiment	0.0018 (0.016)	-0.0033 (0.018)	0.0027 (0.016)	-0.0022 (0.017)
C19 $\times$ ESG sentiment	0.0358** (0.016)	0.0418** (0.019)	0.0007*** (0.000)	0.0008*** (0.000)
Observations	60,479	60,479	60,382	60,382
R^2	0.393	0.393	0.393	0.393
Firm financial controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Notes: The dependent variable is AbaccRank. The C19 variable definition is indicated at the top of each column, and can be the C19 dummy or the Oxford econ. index. The ESG sentiment indicated at the top of each column can be based on the overall or net measures. Firm financial controls are: lnTA, ROA, debt_TA, and cash_TA. Standard errors are reported in parentheses and are clustered at the firm and country-year level. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level. See Table 1 for descriptive statistics of the variables, and Table A1 for their complete definitions.