Does ESG Reputation Risk Matter? Evidence from Leverage Adjustments

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Abstract

This study examines the impact of reputation risk, measured by publicly disclosed environmental, social, and governance (ESG) incidents, on corporate leverage speed of adjustment (SOA). Through analyzing a global sample of 11,049 firms across 35 countries from 2008 to 2019, we find that firms with higher media coverage of negative ESG incidents tend to have a lower leverage SOA. The result is robust to addressing identification issues, alternative leverage measures and estimation techniques. We further find that the negative effect is more visible in firms that are highly reputable and more subject to public scrutiny. We explore the possible mechanism through which ESG reputation risk could have a significant effect on firms' leverage SOA. We find that ESG reputation risk destroys brand value and the reputation of firms, thereby reducing competitive advantages and restricting access to capital markets. Overall, our study supports the dynamic trade-off theory that firms with market frictions adjust their capital structures less often.

JEL Classification: G32, M14

Keywords**:** Corporate social irresponsibility, reputation risk, media coverage, capital structure dynamics

1. Introduction

Existing capital structure theories demonstrate that bankruptcy costs are an important determinant of optimal leverage (Fischer, Heinkel & Zechner, 1989; Strebulaev, 2007). Bankruptcy costs include both direct expenses associated with the bankruptcy process and indirect costs attributed to reluctance of stakeholders (such as customers, suppliers, workers, and investors) to do business with a firm that is likely to fail. The reluctance may arise as a result of being unable to honor a firm's implicit contract and maintain a favorable reputation (Titman, 1984; Maksimovic & Titman, 1991). When reputation is tarnished, firms are likely to suffer substantial bankruptcy costs, thereby limiting their ability to adjust capital structures to an optimal level.

One anecdotal example is the Volkswagen missions cheating scandals. Prior to 2015, Volkswagen had deliberately installed a technology that could detect and circumvent standardised emission tests. When the United States Environmental Protection Agency (EPA) handed this German carmaker a notice of violation of the Clean Air Act, the company's reputation took a huge hit when consumers realised their automobiles had been compromised. Following the announcement, Volkswagen position in the automobiles industry had been knocked off the top spot by Toyota company. [1] In addition, the credit rating agency has drastically lowered the company's rating, which has raised the company's capital market access costs.

In this paper, we investigate how a firm's reputation risk, measured by publicly disclosed ESG incidents, affects leverage adjustment decision. We define ESG-related reputation risk as the risk of loss of firm value because of negative reputation arising from the company's handling of ESG issues. ESG reputation risk has recently found to have a negative impact on firms' revenues,

[1] See "Volkswagen loses sales top spot to Toyota after emissions scandal". Available at: https://www.theguardian.com/business/2015/oct/26/volkswagen-top-spot-toyota-vw-emissions-scandal, accessed on 09/09/2022.

brand value, and share price (Karpoff, Lott & Wehrly, 2005; Matsumura, Prakash & Vera-Munoz, 2014; Frost et al., 2022; Wong & Zhang, 2022). We argue that firms with a great degree of publicly disclosed ESG incidents are presumably those highly exposed to threat of reputation damage, which restrict firm behavior due to its impact on market value and prospects. The quantum of reputation damage can be thought of as the increase in bankruptcy costs caused by the reluctance of stakeholders to do business with the firm. Thus, we hypothesize that a firm's ESG-reputation-risk exposure tends to decrease its speed of leverage adjustment (SOA). To test our hypothesis, we employ an international sample of 35 countries from 2008 to 2019. There are two benefits to using international data. First, our sample covers a huge number of negative ESG events around the world. Second, using data from multiple countries allows us to investigate the impact of information environments on the relationship between reputation risk and leverage adjustments (Öztekin & Flannery, 2012; Öztekin, 2015).

Our baseline regressions show that firms with greater degree of reported negative ESG incidents have lower leverage SOA. These results are robust to using alternative measures of leverage, including book and market leverage. They are also insensitive to different econometric methods and robust to addressing identification issues. Strikingly, we find that the effect of ESG-reputation-risk exposure on SOA tends to be present in both under- and over-levered firms. Additionally, we conduct two quasi-natural experiments of global disasters and scandals (e.g., Deepwater Horizon oil spill disaster in 2010 and the Volkswagen emissions scandal in 2015) that cause serious reputation damage for companies to control for country fixed effects and rule out alternative explanations based on country-level channels. In these experiments, we find that firms with high ESG reputation risk have considerably slower SOA during the period of large disasters and scandals.

We next seek to identify the mechanisms to understand the underperformance of firms with highly ESG incidents. We find that reputation-risk firms have lower gross margins, profitability, and revenues than other firms (*customer channel*). They are also less able to raise debt and equity (*investor channel*). We further find that the negative effect of ESG reputation risk on SOA is more concentrated among firms with high competitive advantages in product market and firms operating in strong institutional countries (e.g., countries with easier access to external markets and fewer statutory financial constraints). Overall, our evidence lends strong support to the hypothesis that publicly disclosed ESG incidents reduce competitive advantages, restrict access to capital markets, and hence decrease the SOA.

To provide more systematic evidence, we conduct three additional cross-sectional tests on how the impact of ESG reputation risk on firms' SOA varies. First, we interact the ESG reputation risk measure with corporate reputation, measured by the amount of news about a firm, a firm's market value, and the number of financial analysts covering it. The result suggests that the impact of ESG reputation risk on leverage SOA is stronger for highly reputable firms. Second, we examine the impact conditional on different levels of social norms. Consistent with previous findings, the result illustrates that in a market in which stakeholders have a high level of awareness regarding ESG issues, negative news on ESG misconduct destroys the brand value and reputation of firms more profoundly, leading to sharply slower SOA. Finally, motivated by literature on institutional determinants of capital structure adjustment speeds (Öztekin & Flannery, 2012; Öztekin, 2015), we take into account the influence of institutional environments in each country. We find that the negative impact of reputation-risk exposure is stronger for firms operating in countries with stronger governance effectiveness. In countries with better institutions (i.e., stronger governance effectiveness), investor protection and legal enforcement are strong and ensure that stakeholder

rights are implemented in times of need. So when firms conduct business in such countries, their wrongdoings are punished harshly, making it more difficult for firms to issue either debt or equity that leads to lower adjustment speeds.

This research contributes to the existing literatures in several ways. First, this research fits well within the empirical literature on adaptations to the dynamic capital structure. Recent research has enhanced our knowledge of cross-sectional variance in the SOA. Our study is mostly connected to the previous research (Faulkender et al., 2012; Öztekin & Flannery, 2012; Öztekin, 2015; Dang et al., 2019; An et al., 2021) which investigate the international drivers of SOA using dynamic partial adjustment models of capital structure. We introduce the first research that employs reputation-risk exposure as a crucial component that explains the variation in SOA, adding to this line of literature.

Second, this paper is related to the huge literature on corporate social responsibility (CSR). Despite existing studies document the positive impact of CSR on corporate performance (Dhaliwal et al., 2011; Dhaliwal et al., 2012; Cheng, Ioannou & Serafeim, 2014; Lins, Servaes & Tamayo, 2017, among others), far less attention has been given to the market consequences of corporate social irresponsibility (CSI) behavior, as reflected by ESG incidents. However, there is increasing evidences showing that CSR and CSI co-exist (Servaes & Tamayo, 2013; Oikonomou, Brooks & Pavelin, 2014; Kang, Germann & Grewal, 2016; Price & Sun, 2017). In particular, a company that actively performs CSR tasks may nevertheless conduct socially irresponsible activities in some way. For example, after being accused by the EPA because of cheating on the emissions test, in the same month when this news was covered, Volkswagen claimed itself as a “corporate citizen” and advocated its social commitments on its website (Riera & Iborra, 2017). This implies that CSR and CSI might be carried out by firms simultaneously. We focus on analyzing the consequences

of ESG-risk exposure on corporate policies. Importantly, by controlling for ESG ratings we show that our main findings are not driven by CSR performance. Thus, different from studies on CSR and leverage SOA (Do, Huang & Lo, 2020; Ho et al., 2021),[2] we document that ESG reputation risk can influence a firm's ability to raise capital and adjust capital structure.

Finally, our study adds to a growing body of research that links ESG-related reputation risk to various dimensions of corporate performance and information environment. Specifically, these studies find that a higher degree of reported negative ESG incidents is associated with grave financial risk (Kölbel, Busch & Jancso, 2017), lower likelihood of and longer duration till acquisition completion (Hawn, 2021), increased auditor fees (Burke, Hoitash & Hoitash, 2019), higher bank loan costs (Becchetti & Manfredonia, 2022), and higher CEO turnover (Colak, Korkeamaki & Meyer, 2021). This line of research, however, provides little insight into the effect of negative ESG incidents on corporate capital structure, especially capital structure dynamics that have received the most attention in the literature (Fama & French, 2002; Leary & Roberts, 2005; Flannery & Rangan, 2006). We document that ESG reputation risk impedes the leverage adjustment speed toward target leverage, and thus our paper contribute to the market consequences of negative ESG behaviors.

The remainder of this paper is organized as follows. The next section covers the literature review, conceptual framework, and the hypotheses development. In Section 3, we outline our research design. Data and variable construction are reported in Section 4. Empirical analyses are

[2] Do, Huang & Lo (2020); Ho et al. (2021) find that CSR is positively associated with the leverage SOA. This finding, however, does not necessarily imply a negative association between ESG reputation risk and the SOA. While information about CSR is commonly self-disclosed in a firm's annual report, information about ESG incidents is commonly covered by the media. Moreover, recent studies show the coexistence of CSR and CSI, which are hard to disentangle in the financial reports by firms. While it frequently takes a company several years to build a positive reputation through CSR initiatives, an ESG incident can instantly harm a company's brand once it becomes public knowledge. Since CSR and media-covered ESG have substantively different economic impacts on firms, the inferences in Do et al. and Ho et al. cannot be used to draw inferences on the impact of ESG reputation risk on the SOA.

reported in Section 5. Section 6 provides additional robustness checks. In Section 7, we present our discussion and conclusion.

2. Literature review and hypothesis development

2.1. Corporate reputation and ESG reputation risk

Corporate reputation is determined by the value of a firm's previous efforts and emerges in the repeated comparison against its competitors. Resource-based theory suggests that firms with high reputation which is regarded as an intangible asset possess a competitive advantage and may expect to earn superior returns (Barney, 1991; Boyd, Bergh & Ketchen Jr, 2010). Previous research demonstrate that a company's reputation may give sustained competitive advantages and improve its financial, investment, and economic performance.[3] Indeed, corporate reputation helps lower implicit and explicit cost of contracts with governments, employees, customers, suppliers, and the community at large (Roberts & Dowling, 2002; Flammer, 2018). Further, as reflected in corporate risks, Diamond (1989, 1991) argues that firm reputation is highly related to access to capital market and cost of capital. Demiroglu & James (2010) find that more reputable private equity groups pay lower bank and institutional loan spreads with longer loan maturities. In line with these studies, Cao et al. (2015); Pfister, Schwaiger & Morath (2020) show that reputable firms enjoy a lower cost of capital due to affecting investor recognition and improving risk sharing. Previous research argues that ESG activity can build good moral capital across a variety of stakeholders, which can provide "insurance-like" protection for a company and increase shareholder wealth (Godfrey, 2005). But if a firm acts irresponsible and ends up in the media spotlight, it can cause significant impair the public's trust and damage to the reputation. Indeed, extensive media coverage of misbehavior (e.g., ESG-related misconduct) influences the reputation of firms in the eyes of

[3] For an overview see, e.g., Rhee & Valdez (2009); Gatzert (2015).

society at large, thereby incentivizing firms to avoid actions that erode reputational capital (Dyck, Volchkova & Zingales, 2008; Baloria & Heese, 2018). Anecdotal evidence further supports this view. For example, ESG scandals such as the Deepwater Horizon oil spill disaster in the Gulf of Mexico in 2010 or the Volkswagen emissions scandal in 2015 led to a widespread negative media coverage, evoked fierce protest from customers, and reduced creditworthiness, which have combined to severely damage the firm reputation (Bachmann et al., 2021).

Recent empirical studies on adverse media coverage of ESG incidents have revealed that this coverage negatively affects firms in various ways and prevails worldwide. For example, Hawn (2021) finds that media coverage of socially irresponsible activities delays or blocks the completion of cross-border mergers. Frost et al. (2022) find a negative relationship between the coverage and firm value in a sample of firms from 43 countries. Becchetti & Manfredonia (2022) show in a sample of 889 worldwide firms that those with higher negative media attention on ESG issues pay higher borrowing costs. Using data from 18 countries, Colak, Korkeamaki & Meyer (2021) document that the likelihood of CEO turnover increases significantly when a firm's ESG risk reaches extreme levels.

Despite the sheer magnitude of corporate reputation, especially following drastically increasing attention on social and environmental issues, the implication of corporate reputation for dynamics capital structure is scarce. In line with the stream of research using a novel dataset that allows us to capture and trace the perception of the general public on corporations' ESG performance, we evaluate the base effect of reputation risk on a firm's leverage adjustment decisions.

2.2. The leverage speed of adjustment (SOA)

According to trade off theory, firms have an optimal level of leverage, that considers both costs (e.g. bankruptcy cost, financial distress and agency conflict) and benefits (e.g. tax savings and mitigated agency costs). By operating at the optimal level, firms can maximise their value. In the poll conducted by Graham & Harvey (2001), more than 80% of Chief Financial Officer claim that their firms have target leverage. Dynamic trade off models suggest that firms have a target leverage and works toward the target (Flannery & Rangan, 2006; Byoun, 2008; Huang & Ritter, 2009). In addition, speed of adjustment is related to agency costs, which are related to agency costs and adverse selection problem (Leary & Roberts, 2005; Strebulaev, 2007).

The literature has documented a number of determinants of leverage SOA. At the firm level, the speed at which firms adjust to their target leverage is affected by the deviation from the target leverage and financial needs (Byoun, 2008), cash flows (Faulkender et al., 2012), equity mispricing (Warr et al., 2012), and corporate governance (Chang, Chou & Huang, 2014; Do, Huang & Ouyang, 2022). At the country level, Öztekin & Flannery (2012) find that better institutions lower the transaction costs associated with adjusting firms' leverage. Consistently, external governance mechanisms (e.g., news media coverage and foreign institutional ownership) are found to be positively associated with leverage adjustment speeds (Dang et al., 2019; An et al., 2021). Recently, Ho et al. (2021) show that firms with superior corporate sustainability performance tend to adjust faster toward their target leverage ratios. Overall, the objective of this paper is to explore the extent to which ESG reputation risk impacts the leverage SOA, which is worth discussing in the literature (Ho et al., 2021).

2.3. ESG reputation risk and the SOA

Our main hypothesis rests on two streams of research. First, Servaes & Tamayo (2013) make the point that CSR activities can enhance firm value; however, firms with high public

awareness are also sanctioned more by their stakeholders when they are scandalous about ESG issues. Stakeholder sanctions come in many forms ranging from the loss of trust and non-cooperation over legal prosecution to boycotts, protests, and sabotage (Baron & Diermeier, 2007; Kölbel, Busch & Jancso, 2017). Stakeholder sanctions have a negative effect on firm's profits, e.g., through decreased sales due to a damaged reputation or increased costs due to production delays. The lost profits are often attributed to the reluctance of customers and other stakeholders to do business with a firm in financial difficulties (Maksimovic & Titman, 1991). In fact, Kölbel, Busch & Jancso (2017) show that severity ESG reputation risk increases financial risk. Becchetti & Manfredonia (2022) also find a positive association between negative ESG and bank loan costs. Therefore, firms exposed to a high ESG reputation risk are presumably those with financial difficulties.

Second, according to the dynamic trade-off theory of capital structure, when firms adjust their leverages toward targets, they consider a trade-off between adjustment costs and a suboptimal leverage ratio (Fischer, Heinkel & Zechner, 1989; Strebulaev, 2007). When the adjustment costs of an immediate adjustment outweigh the benefits of doing so, it becomes optimal for firms to wait until the accumulated adjustment benefits are sufficient to offset recapitalization costs. Thus, firms in financial difficulties usually find it expensive to move toward their target leverage ratios (Korajczyk & Levy, 2003; Öztekin & Flannery, 2012).

Taken all together, under the presumption that increases in ESG reputation risk generate financial difficulties, we would expect that ESG reputation risk and leverage adjustments are negatively related. This forms our main hypothesis.

H1: *Firms with higher ESG reputation risk are expected to adjust their corporate leverage more slowly*.

We further investigate channels through which ESG reputation risk lowers capital structure adjustment speed. There is a rapidly growing body of research on the nexuses between ESG reputation risk and competition advantages as well as between ESG reputation risk and access to external financing. A solid reputation can offer sustainable competitive advantages and benefit a firm by improving financial, investment and economic performance (Gatzert, 2015; Deephouse, Newburry & Soleimani, 2016; Wong & Zhang, 2022). Also, ESG-related performance cultivates trust between investors and managers, thereby reducing adverse selection costs, and consequently eases access to external financing (Kim, Park & Wier, 2012; Cheng, Ioannou & Serafeim, 2014; Lopatta, Buchholz & Kaspereit, 2016; Lins, Servaes & Tamayo, 2017).

On the flip side, ESG reputational risk is expected to have the opposite effect. As discussed previously, customers are likely to be wary of doing business with companies that are unable to sustain their reputation in the marketplace. This would lead to a decline in the companies' competitive advantages, an increase in bankruptcy costs, and ultimately slower SOA. We investigate this *customer channel* by studying the variation of the impact of ESG reputation risk with the level of company's competitive advantages. If competitive advantages are eroded by ESG reputation risk, then the impact of ESG reputation risk on the SOA should be more pronounced for firms with bigger competitive advantages. We formulate second first hypothesis as follows.

H2: *The relation between ESG reputation risk and the leverage SOA is more pronounced among firms with higher competitive advantages.*

Next, we turn to *investor channel*. There is growing evidence showing the negative impact of adverse media coverage of ESG activities on investors' valuation and subsequently, leading to

increases in the cost of capital (Becchetti & Manfredonia, 2022; Wong & Zhang, 2022). So if a tarnished reputation makes it difficult to raise capital, we expect to observe a stronger negative effect of ESG reputation risk on SOA among firms with easier access to capital markets. We propose the following hypotheses to reflect these views.

H3: *The relation between ESG reputation risk and the leverage SOA is more pronounced among firms with easier capital raising.*

3. Model specification

3.1. Partial adjustment toward target

Following previous research (Faulkender et al., 2012), we apply the following partial adjustment model to estimate the target leverage:

$$\Delta LEV_{i,j,t+1} \equiv LEV_{i,j,t+1} - LEV_{i,j,t} = \alpha + \lambda(LEV^{*}_{i,j,t+1} - LEV_{i,j,t}) + \delta_{i,j,t+1}, \quad (1)$$

In which, $\mathrm{LEV}_{i,j,t}$ denotes the book leverage ratio of firm *i* in country *j* at the end of period *t*, and $\mathrm{LEV}_{i,j,t+1} - \mathrm{LEV}_{i,j,t}$ is difference in book leverage between time t and the following period.[4] $\mathrm{LEV}^{*}_{i,j,t+1}$ is the target leverage ratio while $\mathrm{LEV}^{*}_{i,j,t+1} - \mathrm{LEV}_{i,j,t}$ is the deviation from the target leverage ratio. $\delta_{i,j,t+1}$ is the residual of the model. According to the partial adjustment model, λ captures the degree of leverage deviation from the optimal point. The estimated λ in the model is speed of adjustment. The value of λ ranges between 0 and 1 with higher value of λ indicates a faster adjustment speed.

[4] We use book leverage as our primary measure of leverage because recent studies (Yin & Ritter, 2020) show an upward bias of market SOA. In particular, by decomposing market SOA into a passive component associated with the firm value growth rate and an active component related to a firm's net debt issuance or repurchase policies, Yin & Ritter (2020) argue that the high level of the estimated market SOA is due primarily to the passive component. In a robustness test, our result still holds using market SOA.

Regression (1) relies on an estimated target leverage, $LEV^{*}_{i,t+1}$. We follow recent papers (Faulkender et al., 2012; Öztekin, 2015) and estimate a target leverage first, and then Eq. (1) can be estimated by ordinary least squares (OLS) with boot-strapped standard errors to account for the generated regressors (Pagan, 1984). The target leverage ratio $LEV^{*}_{i,j,t+1}$ is not directly observed, but is typically modeled as a function of a firm's characteristic factors: $LEV^{*}_{i,j,t+1} = \beta X_{i,j,t}$. Here, β is a coefficient vector, and $X_{i,j,t}$ is a commonly used vector of firm characteristics including firm profitability ratio (ROA), market-to-book ratio (MB), depreciation as non-debt tax shields (DEP), natural logarithm of firm asset as firm size (SIZE), asset tangibility (TANG), research and development (R&D) expenditures, an R&D dummy (R&DD) to capture R&D disclosure, effective tax rate (TAX), liquidity (LIQUID), the industry-median leverage ratio (INDLEV).We also control for country-level variables such as), the inflation rate (INFL), the GDP growth rate (GGDP), and stock market capitalization (MCAP).[5] Model (1) can then be rewritten as:

$$LEV_{i,j,t+1} = \alpha + \lambda\beta X_{i,j,t} + (1-\lambda)LEV_{i,j,t} + \delta_{i,j,t+1}. \quad (2)$$

Note that as Eq. (2) is a dynamic panel data model and the dependent variable (i.e., debt ratio) is fractional (i.e., bounded between 0 and 1), using the traditional pooled OLS or fixed effects estimators leads to biased and inconsistent estimates (Lemmon, Roberts & Zender, 2008; Elsas & Florysiak, 2015). Therefore, to address the econometric concerns related to estimating dynamic panel data models, we estimate Eq. (2) via Blundell & Bond (1998) system GMM and compute $\widehat{LEV}^{*}_{i,t+1}$and the deviation from the target leverage ($DLEV_{i,j,t} \equiv \widehat{LEV}^{*}_{i,j,t+1} - LEV_{i,j,t}$).

3.2. The impact of ESG reputation risk on the leverage SOA

[5] Appendix A presents variable definitions and data sources.

Based on our hypotheses, we model λ in Eq. (1) as a function of ESG reputation risk as follows:

$$\lambda_{i,j,t} = \gamma RRI_{i,j,t} + \eta X_{i,j,t}, \quad (3)$$

In this model, we control for reputation risk index (RRI), which is CRRI or PRRI, and the control variables used in Eq. (1) (i.e., X).[6] CRRI is the RepRisk Index, which assesses the current level of negative ESG occurrences reported by the media for each company on a monthly basis. PRRI is the Peak RepRisk Index for each company, as measured over the previous twenty-four months. The estimated coefficient,, in Equation (3) measures the effect of RRI on the SOA.We next plug Eq. (3) into Eq. (1) and obtain the following model:

$$LEV_{i,j,t+1} - LEV_{i,j,t} = \alpha + (\gamma RRI_{i,j,t} + \eta X_{i,j,t}) \times DLEV_{i,j,t} + \delta_{i,j,t+1}. \quad (4)$$

Note that γ is the primary variable of interest, measuring the effect of reputation risk on leverage SOA. Here, η is the vector of coefficients on the interaction items between the control variables and leverage deviation.

Our second and third hypotheses argue that competitive advantages and ease access to capital may influence the negative link between reputation-risk exposure and the SOA. To test these hypotheses, we include cross-sectional variable (*CS*) and its interaction with ESG reputation risk in our empirical setting:

$$\lambda_{i,j,t} = \gamma_1 RRI_{i,j,t} + \gamma_2 RRI_{i,j,t} \times CS_{i,j,t} + \gamma_1 CS_{i,j,t} + \eta X_{i,j,t}, \quad (5)$$

Similarly, we plug Eq. (5) into Eq. (1) and obtain the following model:

$$LEV_{i,j,t+1} - LEV_{i,j,t} = \alpha + \left(\gamma_1 RRI_{i,j,t} + \gamma_2 RRI_{i,j,t} \times CS_{i,j,t} + \gamma_1 CS_{i,j,t} + \eta X_{i,j,t}\right) \times DLEV_{i,j,t} + \delta_{i,j,t+1}. \quad (6)$$

[6] In our robustness tests, we find that our inferences are unaltered if we additionally include CSR performance into the controls.

$CS_{i,j,t}$ is a proxy for high competitive advantages and ease of capital raising. If the second and third hypotheses hold, then we should expect $\gamma_2 < 0$.

4. Sample and variable construction

The sample is compiled from multiple distinct data sources. RepRisk (www.reprisk.com), a Swiss firm specialising in risk management, provides statistics on ESG reputation risk at the firm level. RepRisk is the leading information supplier on corporate reputational risk for financial intermediaries, insurance providers, and institutions (Ho et al.,2021). The RepRisk Index (RRI) assigns a number between 0 and 100 to a company's vulnerability to reputational risks connected to environmental, social, and governance (ESG) concerns. The RepRisk score rises if media attention intensifies (if the news comes from a more prominent media source or has a broader scope than anticipated); otherwise, it declines gradually and reaches zero when the incident is forgotten or forgiven.Worldscope provides us with firm-level accounting information. At the country level, the data contain both time-invariant variables from the current literature and time-varying variables from the World Development Indicators (WDI), World Value Survey (WVS), and United Nations Development Programme (UNDP) (UN). Appendix A provides a comprehensive explanation of the variables. To mitigate the influence of outliers, the 1st and 99th percentiles of all continuous variables are winsorized. Our initial sample comprises all companies in 35 countries from 2008 to 2019. As is conventional, we exclude financial and utility companies because their financing policies are subject to stringent rules and policy. To be included in the study where we apply dynamic panel data models, a company must also have data for all variables for a minimum of two years. These processes result in a final sample of 11,049 firms with 97,020 observations per firm-year.

The number of firms and firm-year observations for each country are shown in Table 1. It indicates that sample coverage varies substantially between nations. The US represents the highest percentage of our sample (19,551 observations, equivalent to 20.15%), followed by China (14.22%) and Japan (9.54%). Compared to developing countries, developed countries generally have a longer sample period and bigger data coverage. In addition, Table 1 present the means of target leverage, leverage deviation (in absolute value), current RepRisk index, and current peak RepRisk index for each country. Israel has the largest leverage deviation (0.224), and Brazil and India have the smallest leverage deviation (0.108). There is a large variation in firms' ESG reputation risk across firms from different countries. Germany (12.3) tends to observe the highest score of RepRisk index, whereas Pakistan (3.0) has the lowest.[7]

The mean, standard deviation, 25th, 50th, and 75th percentile values of firm-, industry-, and country-level variables are shown in panel A of table 2. All of the observed firm characteristics fit within acceptable ranges and are broadly consistent with earlier research in terms of magnitude, as indicated by the statistics. For example, the mean (0.330 and 0.079), median (0.268 and 0.025), and standard deviation (0.307 and 0.259) values of the target leverage ratio and the leverage deviation closely correspond to estimates presented in Faulkender et al. (2012). The mean and median values of current RepRisk index for our sample of firms are 0.065 and 0, which are also close to the values reported by Kölbel, Busch & Jancso (2017). On average, a firm in the sample has a book leverage ratio of 25.1%. Additionally, an average firm in our sample has a market-to-book ratio of 2.52, a depreciation ratio of 3.7%, an asset tangibility ratio of 31.5%, and an R&D ratio of 1.5%.

[7] RepRisk examines the severity (CSR news is more severe in terms of its consequences on health and whether it is the result of deliberate activity or an accident), scope (kind and extent of media coverage), and uniqueness of the information, then assigns a score between 0 and 100 to each company. In our study, the score is divided by 100.

[Insert Table 1 about here]

Table 2, Panel B provides the Pearson correlation coefficients between the variables in our main regression. The reputation-risk measures, CRRI and PRRI, are positively associated with firm leverage, total assets, profitability, depreciation, and asset tangibility; and it is negatively associated with R&D ratio and asset liquidity. It is interesting to note that the positive correlation between reputation risk and firm leverage suggests that firms that place low value on ESG issues are likely to have high leverage, which is consistent with the capital structure model proposed by Maksimovic & Titman (1991). In addition, from this correlation matrix, it is evident that multicollinearity among the independent variables is unlikely, as the correlation coefficients are relatively small.

[Insert Table 2 about here]

5. Empirical results

5.1. ESG reputation risk and capital structure adjustment patterns

We commence our analysis by evaluating patterns of capital structure adjustment. Higher costs of debt and equity issuance linked with ESG reputation risk should influence the frequency and amount of a company's access to capital markets. Capital market access is defined as a debt issuance (D. Issue), debt retirement (D. Retire), or equity issuance (E. Issue) that exceeds 5% of a company's lagging total assets. The equity retirement (E. Retire) value criterion is now 1.25 percent (instead of 5 percent)., as suggested by Leary & Roberts (2005). The percentage of firm years in which our sample firms access external capital markets (Panel A) and the volume of capital structure adjustments (Panel B) varies between firms with high and low ESG reputation risk, as

shown in Table 3.. High (low) ESG reputation risk is measured using the current RepRisk index where positive (zero) scores indicate high (low) reputation risk.[8] Access to external capital markets is broken down between debt and equity securities. We also investigate internal capital structure management, which is denoted by internally funded changes in retained earnings.

In line with the findings of Öztekin & Flannery (2012); Çolak, Gungoraydinoglu & Öztekin (2018), all forms of external financing activities are relevant for capital structure adjustment in our global sample of firms. Also, consistent with Leary & Roberts (2005), debt transactions are more important for the leverage adjustment process than equity transactions (both in frequency and size of adjustments). Firms with high reputation-risk exposure, on average, tend to access to debt market more frequently than those with low reputation-risk exposure, e.g., 47.2% vs. 42.9% in case of debt issuance and 43.8% vs. 40.1% in case of debt retirement, correspondingly. However, the magnitudes of access (shown in Panel B) follow an opposite pattern. The higher level of reputational risk associated with ESG hinders firms from obtaining larger amounts of debt issuance. The difference in size of adjustments between high vs. low ESG reputation risk is -0.004 (t-value=2.88). Interestingly, such firms also find it difficult to issue larger amount of equity, compared to their low reputation risk counterparts. Overall, results from Table 3 suggest that firms with a high reputation risk have access to capital markets (through debt issue, debt retire, and equity retire) more often than their counterparts with a low reputation risk. However, they are not given much. The volumes of debt and equity issues are significantly lower.[9] Reputation risk arising from negative ESG conducts affects corporate risk and uncertainty, leading to high cost of capital.

[8] Our results are unaltered when we define low reputation risk with a score of 0–25 and high reputation risk with a score of 50–100, according to RepRisk.

[9] In Table 3, we find that equity retirement is greater (both in frequency and size of adjustments) in high ESG reputation risk groups than in low ESG reputation risk groups. It is possible that a portion of equity retirements is carried out to offset equity issued as part of employee compensation schemes. Hence, some equity retirements are not necessarily intended to adjust capital structure (Çolak, Gungoraydinoglu & Öztekin, 2018).

[Insert Table 3 about here]

Next, using logit model, we regress above leverage adjustments variables (i.e., Internal, D. Issue, D. Retire, E. Issue, E. Retire) on reputation risk (i.e., High CRRI) and a set of controls (including firm profitability, market-to-book ratio, depreciation, size, asset tangibility, R&D ratio, income tax, cash holdings, and capital expenditure). The estimation results are presented in Table 4. Consistent with univariate results, issuances are negatively affected by ESG reputation risk. The odds ratios, presented at the bottom of the table, suggest that the likelihood of debt and equity issuances decrease by about 7 and 9 percentage points form firms with positive current RepRisk index. This implies that possibly because of higher adjustment costs, firms do not make significant changes to their capital structure in response to negative media coverage of ESG incidents. In sum, we find that ESG reputation risk significantly impedes capital markets access and reduces the probability of external adjustments. The odds of external adjustments to capital structure through debt and equity issuances are respectively 7 and 27 percentage points lower for firms with higher media coverage of negative ESG incidents. This finding suggests that ESG reputation risk is likely to act as friction hindering firms' desired capital structure adjustments, which in turn causes delays in firms' convergence toward target leverage levels.

[Insert Table 4 about here]

5.2. ESG reputation risk and leverage SOA

5.2.1. Main results

We investigate the impact of ESG reputation risk on the capital structure dynamics of a company. Our primary study relies on a two-step regression framework to estimate the model of

partial adjustment. In the first stage, the observed financial leverage is regressed against a range of leverage determinants, and its fitted value is then extracted as the target leverage. In the second step, we employ the target leverage obtained in the first step regression to assess the effect of ESG reputation risk on the SOA by estimating the partial adjustment model depicted in Eq (4). In accordance with previous research (Faulkender et al., 2012), we use the bootstrap approach to update the standard errors to account for the created regressor.

Table 5 reports the ordinary least squares (OLS) regression results for the impact of ESG reputation risk on the SOA. The dependent variable is the actual leverage adjustment (ΔLEV). All independent variables are multiplied by the leverage deviation from the target (DLEV). Our independent variable of interest is the interaction between the deviation from target leverage and the extent of publicly disclosed ESG incidents, measured by CRRI or PRRI. Columns (1) and (4) report the results for the full sample. We find the coefficients of CRRI×DLEV and PRRI×DLEV are negative and statistically significant, suggesting that leverage SOA is decreasing with ESG reputation risk. This relationship also appears economically meaningful. In column (1), a one-standard-deviation increase in CRRI (i.e., 0.099, Table 2) leads to a decrease of 1.53 percentage points in SOA.

Further, we define a firm-year observation as under (over) if firms have less (more) leverage than the predicted target leverage. CRRI and PRRI command negative coefficients that are statistically significant in both the under- and over-leveraged subsample (except for Over-levered sample where we use CRRI to proxy for ESG reputation risk). It indicates that both over-leveraged and under-leveraged firms with high exposure to ESG risk are less able to adjust toward their target leverage levels due to disadvantages caused by damaged reputations. Overall, these

results support hypothesis ***H1*** that firms with higher ESG reputation risk tend to adjust their corporate leverage more slowly.

Regarding the effects of control variables on leverage adjustments, we find that most of the results are consistent with prior literature (Flannery & Rangan, 2006; An et al., 2021; Do, Huang & Ouyang, 2022). Specifically, firm size, R&D expenditure, asset liquidity, profitability, and industry median leverage increase the SOA. We do not find conclusive evidence of the relationship between other control variables and SOA, such as R&D dummy, market-to-book ratio and asset tangibility.

[Insert Table 5 about here]

5.2.2. Instrumental variable approach

We examine the robustness of our results by instrumental variable regression. We construct an instrumental variable using mortality rate from air pollution, which is collected from World Health Organization. Air pollution is responsible for seven million global deaths annually.[10] More recent studies tend to find a higher death toll than earlier studies, suggesting the health impacts of exposure to air pollution are larger than previously thought (Heft-Neal et al., 2018). The news media has created public attention towards air pollution and has been effective in raising risk perceptions. Given the rising public awareness of the mortality rate caused by air pollution, it is plausible that firms will receive, *ceteris paribus*, less media attention about their misconduct. In other words, we argue that the mortality rate from air pollution would have a substitution effect on

[10] See "9 out of 10 people worldwide breathe polluted air, but more countries are taking action". Available at: https://www.who.int/news-room/detail/02-05-2018-9-out-of-10-people-worldwide-breathe-polluted-air-but-more-countries-are-taking-action, accessed on 09/09/2022.

publicly disclosed ESG incidents. However, there is no reason to believe that the mortality rate from air pollution could have a direct significant effect on the SOA.

In a two-stage framework, we first regress the RepRisk Index variables on the IV (i.e., mortality rate from air pollution) and then replace RRI in Eq. (4) by the predicted values ($\widehat{\text{CRRI}}$ and $\widehat{\text{PRRI}}$) in the second-stage estimation. Table 6 shows the results of estimations. Columns (1) and (3) present the first-stage regression results, while the second-stage regression results are reported in columns (2) and (4). As expected, we observe that mortality rate is negatively associated with ESG reputation risk (captured by CRRI and PRRI). More importantly, in columns (2) and (4), we find that coefficient estimates on $\widehat{\text{CRRI}} \times \text{DLEV}$ and $\widehat{\text{PRRI}} \times \text{DLEV}$ remain negative and significant at 1% level, indicating that our baseline regression results are robust to correcting for the potential reverse causality.

[Insert Table 6 about here]

5.2.3. Quasi-experimental analysis

In this subsection, we augment our analysis with two quasi-natural experiments of global disasters and scandals (i.e., Deepwater Horizon oil spill disaster in 2010 and the Volkswagen emissions scandal in 2015) that cause serious reputation damage for companies to control for country fixed effects and rule out alternative explanations based on country-level channels. To examine the impact of such exogenous shocks arising from these events on the relationship between reputation risk and the SOA, we utilize difference-in-differences approach following Liang & Renneboog (2017) and Dai, Liang & Ng (2021), as given by:

$$\Delta LEV_{i,j,t+1} = \alpha_0 + \left(\alpha_1 RRI_{i,j,t} + \alpha_2 RRI_{i,j,t} \times Event_{i,j,t} + \alpha_3 Event_{i,j,t} + \eta X_{i,j,t}\right) \times DLEV_{i,j,t} + \delta_{i,j,t+1} \quad (7)$$

The differences-in-differences (DiD) estimator is the coefficient on RRI×Event×DLEV. Event is a binary variable indicating the specific event, e.g., Deepwater Horizon oil spill disaster in 2010 and the Volkswagen emissions scandal in 2015.

First, the Deepwater Horizon oil spill occurred in Mexico on April 20, 2010 due to the explosion and sinking of the Deepwater Horizon oil rig. This catastrophe is regarded as the largest accidental marine oil spill in the petroleum industry's history and had significant environmental consequences. The United States government assessed the total outflow to be 4.9 million barrels (210 million U.S. gallons or 780,000 m3), which immediately polluted 68,000 square miles (180,000 km2) of ocean and had a disastrous impact on marine life in the Gulf. The Deepwater Horizon oil spill was a shock to all energy-related businesses in terms of the environmental implications of production and operations.

Therefore, *Event* indicator takes a value of 1 if a firm operates in Oil & Gas industry in the year 2010, and 0 for all other firm-year observations in the sample. Similar to Dai, Liang & Ng (2021), our indicator does not capture post-event years because we expect media exposure would not be long lasting after such large-scaled scandal.

Second, we utilise as a shock the revelation that Volkswagen installed a system that could detect and circumvent statutory emission tests. When the United States Environmental Protection Agency (EPA) issued a notice of violation of the Clean Air Act to this German automaker, the company's reputation took a significant hit when consumers realised their vehicles were affected. Approximately 11 million automobiles worldwide, including half a million in the United States, were marketed between 2009 and 2015 with a defeat device that allowed them to seem to comply with emissions rules in the test box despite having higher on-road emissions. The issue was a clear surprise to the general public in September 2015, and it quickly attracted substantial media

coverage. The major German news website, Der Spiegel, reported that the Volkswagen crisis will impact the whole German economy and reduce the competitiveness of German enterprises operating overseas..[11] Therefore, as for this emissions scandal, we create *Event* indicator that takes a value of 1 if a firm headquartered in Germany in the year 2015, and 0 for all other firm-year observations in the sample. We take into account the firm headquarters, instead of industry, for the following reasons.

Following the EPA's decision, major automakers like Toyota, GM, PSA Peugeot Citroen, Renault, Daimler (Mercedes Benz), and Honda released press releases reiterating that their vehicles comply with all applicable regulations and laws in the markets where they operate. The Society of Motor Manufacturers and Traders, one of the largest and most prominent trade organisations, opined that there is no evidence to imply that the entire industry could be damaged..[12] Rather than, the scandal had an economically important country specific reputational spillover. Bachmann et al. (2021) empirically show that the VW scandal reduced sales at the other German auto manufacturers by 9.2 percentage points relative to their non-German counterparts. Moreover, evidence shows substitution effect that non-German automotive firms gain benefit from the VW scandal by increasing sales. Toyota said it sold 7.5 million vehicles in the first nine months of the year 2015, beating VW's 7.43 million reported earlier. Toyota outsold Volkswagen in each month of the third quarter.[13]

[11] See "Time for German Industry to Abandon Its Arrogance". Available at: https://www.spiegel.de/international/business/vw-scandal-shows-german-companies-are-no-longer-big-league-a-1055098.html, accessed on 09/09/2022.
[12] See "VW Emissions Scandal: Motor Industry Reaction". Available at https://news.sky.com/story/vw-emissions-scandal-motor-industry-reaction-10345271, accessed on 09/09/2022.
[13] See "Volkswagen loses sales top spot to Toyota after emissions scandal". Available at: https://www.theguardian.com/business/2015/oct/26/volkswagen-top-spot-toyota-vw-emissions-scandal, accessed on 09/09/2022.

The results of the two quasi-natural experiments are reported in Table 7. The variable of interest is the interaction CRRI×Event×DLEV, and its coefficient is negative and statistically significant in both cases. Their coefficient is -0.474 (standard error= 0.283) in column (1) and -0.363 (standard error= 0.212) in column (3). In terms of economic significance, a one-standard-deviation increase in the CRRI (i.e., 0.099, Table 2) in the scandal year will lead to a decrease of 5.13 ($= -(0.153 + 0.363) \times 0.099$) to 6.24 ($= -(0.153 + 0.474) \times 0.099$) percentage points in the SOA in columns (3) and (1), respectively. We find consistent results when using PRRI to proxy for firm reputation risk in columns (2) and (4). These findings suggest that the effect of ESG reputation risk on the leverage SOA is more pronounced in the event year, an indication that the consequences of negative ESG incidents become more intense when public demands for responsible business practices are greater following major scandals.

[Insert Table 7 about here]

5.2.4. Plausible channels

5.2.4.1. ESG reputation risk and operating performance

This section mainly explores the possible mechanism for the negative impact of firms' reputation risk on the SOA. We firstly study the operating performance of companies with high exposure of reputation risk. Specifically, we investigate the impact of ESG-related reputation risk on different measures of performance using the following regression model:

$$\text{Outcome}_{i,j,t} = \alpha_0 + \alpha_1 \text{CRRI}_{i,j,t} + \eta \text{X}_{i,j,t} + FEs + \delta_{i,j,t} \quad (8)$$

The *Outcome* includes *Gross Margin*, measured as (sales – cost of goods sold) / sales; *ROA*, measured as operating income to assets; Selling, General & Administrative (*SG&A*) Expense divided by Assets; *Accounts Receivable* divided by Sales, and *Sales Growth*. In all models, we

include the set of control variables and country, industry, and year fixed (CIY) effects. In Table 8, the results show negative relationships between ESG reputation risk and gross margin, ROA, and sales growth. Further, we study changes in accounts receivable as a fraction of sales to get a better understanding of customers' responses to a company's ESG reputational risk. The coefficient estimates for CRRI is positive and statically significant, suggesting that customers of high-reputation-risk firms are not paying their invoices any faster. Reputation risk can translate into a decreased competitive advantage in the marketplace and reduced market power, which in turn increases a firm's incentives to offer trade credit to customers. As argued previously, given that reputation of corporations is damaged following publicly disclosed ESG incidents, observing some lackluster operating performance for such firms is not surprising.

In sum, the operating performance results discussed in this section indicate that one of the channels through which high-reputation-risk firms lower SOA is the hesitation of customers to continue supporting these firms, as reflected in lower sales and gross margin but higher operating expenses and account receivables. Combined with the findings in Table 4 demonstrating the relatively difficult to issue debt and equity, the evidences presented up to this point suggest that negative media coverage of ESG incidents destroys brand value and reputation of firms, reducing competitive advantages and driving up leverage adjustment costs. This, in turn, impedes leverage SOA. We analyze this mechanism next.

[Insert Table 8 about here]

5.2.4.2. Competitive advantages

Based on ***H2***, we contend that if ESG reputation risk destroys brand value and the reputation of firms, and thus reducing competitive advantages, then the negative impact of ESG

reputation risk should be stronger for firms with larger competitive advantages in marketplace. To test this prediction, we run Eq. (6) in which ROIC (Return on invested capital), Brand Value, and HHI (Herfindahl-Hirschman Index) are cross-sectional variables. ROIC and Brand Value are obtained from Worldscope database and defined in Appendix A. HHI is calculated as the sum of the squared market shares using firm sales, based on four-digit (SIC) Industry classification. When a company has a great profitability ratio (as determined by ROIC) and a high value of brands, patents, and trademarks, it is considered as having strong competitive advantages. Customer loyalty, which is intense when customers have fewer options in a highly concentrated environment (i.e., high HHI), can also be turned into an enormous competitive advantage.

In Table 9, the *Advantages* indicator is a dummy variable indicating the above-median value of ROIC, Brand Value, and HHI in a given year. We observe that the coefficients on the triple interaction term, RRI×Advantages×DLEV, are all negative and significant at a conventional level, indicating that the negative impact of ESG reputation risk on the SOA is amplified for firms with higher advantages in product markets. Our results, therefore, strongly support ***H2*** that the effect of ESG reputation risk on the SOA is more pronounced for firms with a higher degree of competition advantages. In sum, the above results prove that *customer channel* is an efficient channel.

[Insert Table 9 about here]

5.2.4.3. Capital raising

The results from Table 4 suggest that publicly disclosed ESG incidents are highly associated with costs of capital structure adjustments. We argue that the ESG reputation risk can escalate a firm's adjustment costs by making firms less able to raise debt and equity. In institutional

environments with easy access to capital markets (i.e., easy to raise capital), the negative effect of ESG reputation risk on the SOA should be more profound. In Table 10, using three different country-level measures of capital raising, namely Equity Access, Debt Access, and Financial Constraints (Öztekin & Flannery, 2012), we show how the relationship between reputation risk and the SOA is varied.

We create a dummy variable, *Access*, indicating the above-median value of Equity Access, Debt Access, and Financial Constraints in a given year, and then run Eq. (6). While higher values of Equity Access and Debt Access are associated with easy access to capital markets, higher value of the latter imply difficult access. As shown in Table 10, the coefficients on RRI×Access×DLEV are all statistically significant and have completely consistent signs. Supporting to ***H3***, the results provide strong evidence of the investor channel that raising capital is particularly difficult due to negative media coverage of ESG incidents, which in turn impedes a firm's convergence to its optimal leverage.

[Insert Table 10 about here]

5.3. Additional analyses: cross-sectional heterogeneity

We perform additional tests to delve more deeply into the nature of the relationship between ESG reputation risk and leverage SOA. We expect that the negative reputation-risk effect on leverage adjustment is amplified by a degree of firm reputation, social norms, and institutional environments. It is simply because firms with better reputations, social norms, and institutional environments are more likely to have a higher stakeholder awareness of ESG and a greater demand for socially responsible behavior. This, in turn, increased scrutiny benefits companies with CSR strengths, but harms companies with CSR concerns (Servaes & Tamayo, 2013). In other words, in

a market in which firm stakeholders have a high level of awareness regarding ESG issues, negative ESG could largely destroy the brand value and reputation of firms. We examine these aspects next.

5.3.1. Firm reputation

The impact of reputation risk on firm performance should depend on how reputable a firm is in the product market. Schuler & Cording (2006) develop some predictions about the alignment between a firm's CSR activities and its prior reputation. In particular, they argue that customers will not respond favorably to CSR information if there is a mismatch between a company's current actions and its prior reputation. Consistently, Servaes & Tamayo (2013) show that firms engaging in and publicizing CSR activities can only add value if these activities and firm reputation are aligned. However, they are also penalized more when there are CSR concerns.

We are particularly interested in three measures that determine firm reputation, that is, media coverage, analyst coverage, and market values of firms. Manager of reputable firms (e.g., large firms or firms with intensive media or analyst coverage) may find it riskier to engage in socially irresponsible activities as the likelihood of detection and expected regulatory fines tend to be higher. This is because the intensive coverage of firms by media or analysts is very likely to reduce the information gap between firms and relevant regulators (e.g., Environmental Protection Agency). The intensive coverage could also reduce the information gap between firms and general public by disseminating information to various users through research reports and media outlets such as newspapers and TV programs, which create more reputational concerns for managers to engage in socially irresponsible activities. When firms are more reputable (i.e., covered by more media or analysts), the costs of being socially irresponsible are higher. Thus, it is reasonable to expect that the adverse effect of ESG reputation risk on the SOA is more pronounced for such firms.

Table 11 summarizes the regression results. In these regressions, we include our proxies for firm reputation as well as interaction terms with RepRisk Index (CRRI, PRRI) and leverage deviation (DLEV). Across all columns, we find that the coefficients of the interactions are all negative and significant at conventional levels, indicating that the negative relation between RRI and the SOA is stronger for firms with a better reputation. Taken together, the results in Table 11 are consistent with the idea that highly reputable firms are more subject to reputation threats, which makes them more sensitive to the adverse effect of media coverage of ESG incidents.

[Insert Table 11 about here]

5.3.2. Social norms

Williams & Aguilera (2008) note that the relationship between social performance and firm value is likely to be contingent on cultural and social norms. Hasan et al. (2017) specify that managers of corporations headquartered in communities with strong social norms would anticipate higher psychic costs and higher social sanctions associated with corporate social irresponsibility activities when compared to managers from corporations headquartered in weak-social-norm communities. Accordingly, in this subsection, we employ empirical proxies for the social norms of different countries. In particular, following Dhaliwal et al. (2012), we firstly employ *Public Awareness*, identifies the level of public awareness of ESG problems across nations. It is determined by the mean country-level of the total number of nongovernmental organisations (NGOs) per million population and the total number of CSR reports published by businesses per million population. The public's awareness of social concerns should be greater in nations with a greater number of nongovernmental organisations (NGOs), as NGOs encourage such awareness. Similarly, the prevalence of CSR reports could increase public social consciousness.Second, we

obtain from World Value Survey (2005-2009 and 2010-2014) the degree to which individuals in a country prioritize the types of activities associated with the natural environment (e.g., social attitudes toward the environment). The survey asks a participant a large number of questions related to various aspects of social, political, economic, religious and cultural values of people in the world, including: "Here are two statements people sometimes make when discussing the environment and economic growth. Which of them comes closer to your own point of view? (1) Protecting the environment should be given priority, even if it causes slower economic growth and some loss of jobs. (2) Economic growth and creating jobs should be the top priority, even if the environment suffers to some extent social attitudes toward environmental protection." In the 2010-2014 survey, there are 85,274 responses to this question. On average, environmental protection is preferred by 47.98% of respondents, while 43.13% of respondents chose economic growth. There is substantial variation across 35 countries in our sample. For example, only 35.2% of the respondents in Spain reply that they want to protect the environment compared to 73.6% in Malaysia.

Our last proxy for social norms is *Business Commitment*, a ESG Combined Score collected from Asset4 database. ESG Combined Scores from Asset4 database based on publicly-reported data, are intended to transparently and objectively measure a company's relative ESG commitment and effectiveness across 10 main themes (resource use, emissions, environmental product innovation, workforce, human rights, community, product responsibility, management, shareholders, and CSR strategy). A corporation with a higher score is more committed to ESG activities.Table 12 presents the regression results in which we proxy for *Norms* using country-level *Public Awareness* and *Environmental Protection* in columns (1)-(4); and firm-level *Business Commitment* in columns (5)-(6). The results show that the coefficients on the triple interaction

term, CRRI×Norms×DLEV or PRRI×Norms×DLEV, are generally negative and statistically significant, meaning that the negative effect of ESG reputation risk on the leverage SOA is stronger for firms operating in countries with higher social norms for ESG behaviors. In line with previous findings, the results suggest that the adverse impact of ESG incidents becomes more intense when public demands for responsible business practices as well as social sanctions for irresponsibility activities are greater.

[Insert Table 12 about here]

5.3.3. Institutional environments

In this section, we investigate the extent to which the relation between publicly disclosed ESG incidents and the speed of leverage adjustment differs across country-level institutional and information characteristics. Our early discussion suggests that ESG reputation risk can escalate a firm's adjustment costs by making firms less able to raise debt and equity. The negative effect of ESG reputation risk on the SOA is more profound for firms operating in institutional environments with easy to raise capital. La Porta et al. (1998) argue that financial markets are more efficient in nations with stronger institutions. In these nations, investor protection and legal enforcement are rigorous, ensuring the implementation of stakeholder rights.When a company conducts business in a better institutional environment, its wrongdoings are punished harshly. Therefore, we predict that the negative association between ESG-reputation-risk exposure and SOA is strengthened in countries with a better institutional environment.

To test this prediction, following prior research we consider three proxies for country-level governance characteristics and information environments, including (i) the rule of law index (*RLAW*), (ii) the regulatory quality index (*RQUALITY*), and (iii) the voice and accountability index

(*VOICE*). We then perform the regression and report results in Table 13. Our results show that ESG reputation risk is more negatively associated with the speed of leverage adjustments in countries with high 'rule of law', 'regulatory quality', and 'voice and accountability'. The results are consistent with literature showing that the greater institutional environment act as a country-level mechanism to enhance firm transparency and lower the transaction costs of external financing.

Above all, our empirical findings imply that when stakeholders have a high level of awareness about ESG issues, firms are likely to be more subject to public scrutiny, and therefore, the repercussions following negative media coverage of ESG incidents are amplified, making firms adjust their capital structures significantly more slowly.

[Insert Table 13 about here]

6. Additional robustness tests

6.1. Reputation risk: Breakdown by E, S, and G

We examine whether it is firms' aggregate ESG or a specific component 'E', 'S', 'G' that is important for leverage SOA. In the Internet Appendix, we document evidence that all three components of ESG matter in the leverage SOA, as their estimated coefficients load negatively and significantly. Previous studies show that certain attributes of CSR are more relevant than others (Do, Huang & Lo, 2020). Differently, we find that the impact of negative ESG on a firm's leverage adjustments comes from all 'E', 'S', and 'G' attributes.

6.2. Alternative econometric method

We consider a newly proposed method for dynamic panel data with a fractional dependent variable (DPF), proposed by Elsas & Florysiak (2015). This method is a Tobit estimator that is

doubly censored and utilises a latent variable approach to account for the fractional character of the dependent variable. Specifically, the latent dependent variable can take on values outside the unit interval, but these values are double-censored at the minimum and maximum value of zero and one. , Elsas & Florysiak (2015) illustrate that DPF can outperform other alternative estimators when estimating the leverage SOA. Dang, Kim & Shin (2015) also demonstrate via Monte Carlo simulations that DPF yields the most accurate estimates of the leverage SOA. We generally find that our baseline results still hold by using the DPF estimation approach, thereby confirming the adverse effect of media coverage of ESG incidents in impeding leverage adjustments toward the optimal capital structure.

6.3. Fixed-effect regression results

Although the baseline model incorporates all reported business features and nation demographic parameters as controls, it may still neglect unknown firm or country elements that influence reputation-risk exposure and leverage SOA. To alleviate this concerns, we employ company fixed-effect regressions and country fixed-effect regressions, respectively, to adjust for the effects of unknown time-invariant firm-level and nation-level factors. The appropriate results are reported in the Internet Appendix. Estimates for CRRIDLEV or PRRIDLEV remain negative and statistically significant at the conventional level for all models. They indicate that the results of the baseline model are not affected by substantial firm-level or country-level factors that were excluded.

6.4. Market leverage SOA

Yin & Ritter (2020)'s recent work has some implications for capital structure adjustment studies. First, "the common practice of reporting both book leverage and market leverage results in empirical capital structure papers should be ended, with only book leverage results reported"

(Yin & Ritter, 2020, p.1950). Yin & Ritter (2020) argue that large stock price fluctuations (rather than large net equity issuances) lead to a higher variance of market leverage than that of book leverage. As a result, market SOA estimates are upward biased. Second, Yin & Ritter (2020) find that the estimated book leverage SOA is 16% per year. Thus, they argue that the trade-off theory is of only modest importance in explaining capital structure decisions. Despite that all our results are built upon book leverage, as suggested by Yin & Ritter (2020), we estimate the effect of ESG reputation risk on market leverage SOA as a robustness test. We find that the result still holds using market SOA.

7. Conclusions

This paper examines how ESG reputation risk affects the firms' leverage adjustment towards their optimal capital structure. Using a large sample of global firms from 2008 to 2019, we find that firms with higher exposure to reputational risks related to ESG concerns tend to have a slower leverage adjustment speed. The result persists after controlling for potential endogeneity problems, alternative leverage measures and estimation techniques. We also investigate the mechanisms of the effect. We find that ESG-reputation-risk firms have lower gross margins, profitability, and sales growth; they are also less able to raise debt and equity. The results, therefore, suggest the reluctance of stakeholders and investors to do business with firms that are scandalous about ESG issues. Our mechanism tests further reveal that the negative effect of ESG reputation risk is more concentrated among firms with high competitive advantages in product market and high access to external markets. In sum, this study lends strong support to the

hypothesis that publicly disclosed ESG incidents reduce competitive advantages, restrict access to capital markets, thereby decreasing firms' SOA.

This study provides insights into how firms make capital structure decisions facing different extend of reputational risk. Inspired by both customer channel and investor channel, our findings underline the importance for regulators and managers to curb corporate social irresponsibility activities, particularly those that are covered by the media. In addition, with the focus on media coverage of ESG incidents, this paper advances our understanding of determinants of capital structure dynamic adjustment. However, it would be worthwhile for future research to examine firms' other financing decisions.

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Appendix A: Variable definitions

Variable	Definition	Data source
CRRI	Current RepRisk Index (RRI)	RepRisk
PRRI	Current peak RepRisk Index: Max CRRI in a given year	As above
TLEV	Leverage estimated using the partial adjustment model	Worldscope
DLEV	Target leverage ratio less lagged leverage ratio.	As above
DR	Book debt ratio. Total debts divided by total assets.	As above
ROA	Earnings before interest and taxes as a proportion of total assets.	As above
MB	Book liabilities plus market value of equity divided by book value of total assets.	As above
DEP	Depreciation divided by total assets.	As above
SIZE	Logarithm of total assets.	As above
TANG	Net property, plant, and equipment scaled by total assets.	As above
R&D	A dummy variable equal to 1 if the firm did not report R&D expenses.	As above
R&DD	R&D expenses divided by sales.	As above
TAX	Current income taxes divided by income before income taxes.	As above
LIQUID	Total current assets divided by total assets.	As above
INDLEV	The median of the book leverage of the industry to which the firm belongs.	As above
INFL	Annual inflation rate. Growth in consumer price index.	WDI
GGDP	Annual growth in nominal gross domestic product (GDP).	As above
MCAP	Stock market capitalization scaled by GDP.	As above
ROIC	Return on invested capital.	Worldscope
Brand Value	The net book value of brands, patents and trademarks.	As above
HHI	Herfindahl-Hirschman Index calculated as the sum of the squared market shares using firm sales, based on four-digit (SIC) Industry classification.	As above
Equity Access	The first principal component of shareholder rights and shareholder right enforcement.	Öztekin and Flannery (2012)
Shareholder rights	The index of shareholder right	La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998)
Shareholder right enforcement	Quality of shareholder right enforcement.	Djankov, La Porta, Lopez-de-Silanes, and Shleifer (2008)
Debt Access	The first principal component of creditor rights and creditor right enforcement.	Öztekin and Flannery (2012)
Creditor rights	Rights of creditor in collecting debt.	La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998)

Creditor right enforcement	Quality of creditor rights enforcement. The index measures substantive and procedural statutory intervention in judicial cases.	Djankov, LaPorta, Lopez-de-Silanes, and Shleifer (2003)
Financial constraints	The first principal component of mandatory dividends and legal reserve.	Öztekin and Flannery (2012)
Mandatory dividend	The percentage of net income that is distributed as dividends, otherwise 0.	La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998)
Legal reserve	The minimal proportion of total share capital required by corporate law in order to prevent the dissolution of an existing business. Countries with no such restrictions are assigned a value of zero.	La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998)
Media Coverage	Total number of news articles about a firm in each year.	RavenPack
Market Values	Market value of total assets.	Worldscope
Analyst Coverage	Number of financial analysts covering a firm.	I/B/E/S
Public Awareness	Public awareness of CSR issues at the national level, determined as the mean rank score of the two factors listed below: (1) Number of non-governmental organisations (NGOs) per million people, as reported by the United Nations, and (2) total number of CSR reports produced by companies, divided by the population of the country, as reported by Datastream.	Dhaliwal, Radhakrishnan, Tsang, and Yang (2012)
Environmental Protection	The degree to which people in a country prioritise activities linked with the natural environment, as measured by the World Values Survey item "Protecting the environment vs economic progress."	World Value Survey
Business Commitment	The ESG Combined Score.	ASSET4
RLAW	Rule of law index.	Kaufmann, Kraay, and Mastruzzi (2011)
RQUALITY	Regulatory quality index.	Kaufmann, Kraay, and Mastruzzi (2011)
VOICE	Voice and Accountability index.	Kaufmann, Kraay, and Mastruzzi (2011)

Table 1. Sample distribution

This table presents the number of firms, number of firm-year observations, and the means of target leverage, leverage deviation (in absolute value), current RepRisk index, and current peak RepRisk index for each economy. The sample consists of 11,049 firms (i.e., 97,020 firm-year observations) across 35 economies from 2008 to 2019.

Market	No. of Firms	No. of Obs.	TLEV	DLEV	CRRI	PRRI
Australia	552	4,031	0.246	0.162	0.051	0.094
Austria	40	387	0.323	0.197	0.063	0.104
Belgium	46	397	0.320	0.196	0.069	0.125
Brazil	178	1,580	0.396	0.108	0.102	0.160
Canada	722	5,474	0.285	0.188	0.057	0.098
China	1,529	13,803	0.333	0.126	0.043	0.082
Denmark	47	422	0.277	0.135	0.072	0.126
Finland	62	572	0.304	0.184	0.089	0.145
France	223	2,097	0.320	0.156	0.101	0.158
Germany	200	1,788	0.292	0.175	0.123	0.183
Greece	37	344	0.429	0.171	0.031	0.064
Hong Kong	333	3,180	0.297	0.141	0.041	0.079
India	635	5,951	0.388	0.108	0.046	0.085
Ireland	57	543	0.311	0.137	0.092	0.153
Italy	102	863	0.365	0.142	0.074	0.120
Israel	115	1,040	0.373	0.224	0.051	0.088
Japan	874	9,256	0.299	0.141	0.055	0.097
South Korea	749	7,232	0.331	0.162	0.059	0.102
Malaysia	175	1,567	0.312	0.162	0.045	0.085
Mexico	81	829	0.357	0.130	0.073	0.121
Netherlands	111	906	0.333	0.153	0.104	0.155
New Zealand	48	405	0.264	0.206	0.045	0.083
Norway	76	666	0.359	0.152	0.086	0.138
Pakistan	55	524	0.389	0.158	0.030	0.058
Philippines	97	897	0.312	0.141	0.056	0.101
Russia	148	917	0.407	0.136	0.095	0.153
Singapore	134	1,269	0.313	0.154	0.045	0.081
South Africa	136	1,281	0.264	0.131	0.082	0.135
Spain	86	743	0.409	0.192	0.089	0.146
Sweden	130	1,122	0.284	0.138	0.079	0.134
Switzerland	110	1,055	0.286	0.142	0.105	0.159
Thailand	86	828	0.388	0.128	0.046	0.084
Turkey	41	444	0.362	0.149	0.034	0.070
United Kingdom	609	5,056	0.281	0.178	0.080	0.133
United States	2,425	19,551	0.370	0.177	0.080	0.130
Total	11,049	97,020				

Table 2. Descriptive Statistics and Correlation Matrix

Panel A presents the mean, standard deviation, 25th, 50th, and 75th percentile values of firm-, industry-, and country-level variables. Panel B provides the correlation matrix for financial leverage and its determinants in the model to estimate the target leverage, as shown in Eq. (1).* indicates significance at the 1% level. All variables are defined in Appendix A.

Panel A: Descriptive Statistics

Variable	Mean	Std Dev	Q1	Median	Q3	Under-levered	Over-levered
Panel A.1: Target and deviation from target							
TLEV	0.330	0.307	0.131	0.268	0.430	0.401	0.227
DLEV	0.079	0.259	-0.049	0.025	0.112	0.196	-0.093
Panel A.2: Reputation risk							
CRRI	0.065	0.099	0.000	0.000	0.127		
PRRI	0.110	0.150	0.000	0.000	0.240		
Panel A.3: Firm- and industry-level variables							
DR	0.251	0.212	0.076	0.226	0.372		
ROA	0.010	0.200	0.008	0.042	0.080		
MB	2.522	3.919	0.841	1.592	3.030		
DEP	0.037	0.030	0.017	0.031	0.048		
SIZE	22.332	2.921	20.555	22.222	24.209		
TANG	0.315	0.241	0.114	0.266	0.469		
R&D	0.015	0.039	0.000	0.000	0.011		
R&DD	0.511	0.500	0.000	1.000	1.000		
TAX	0.193	0.390	0.043	0.222	0.324		
LIQUID	0.461	0.228	0.286	0.455	0.625		
INDLEV	0.219	0.057	0.184	0.224	0.253		
Panel A.4: Country-level variables							
INFL	2.445	2.398	1.125	1.954	2.961		
GGDP	0.029	0.030	0.015	0.024	0.042		
MCAP	1.157	1.810	0.552	0.836	1.153		

Table 2: *Cont.*

Panel B: Correlation Matrix

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1)	CRRI	1												
(2)	PRRI	0.925*	1											
(3)	DR	0.055*	0.056*	1										
(4)	ROA	0.071*	0.066*	-0.106*	1									
(5)	MB	0.006	0.006	-0.085*	0.061*	1								
(6)	DEP	0.053*	0.050*	0.136*	-0.075*	-0.027*	1							
(7)	SIZE	0.273*	0.252*	0.114*	0.366*	-0.083*	-0.070*	1						
(8)	TANG	0.037*	0.033*	0.171*	-0.014*	-0.113*	0.316*	0.024*	1					
(9)	R&D	-0.004	-0.007	-0.100*	-0.227*	0.115*	0.037*	-0.120*	-0.209*	1				
(10)	R&DD	-0.066*	-0.055*	0.085*	-0.016*	-0.034*	0.031*	-0.210*	0.152*	-0.387*	1			
(11)	TAX	0.033*	0.029*	-0.034*	0.126*	-0.002	-0.003	0.122*	-0.016*	-0.059*	-0.006	1		
(12)	LIQUID	-0.133*	-0.123*	-0.226*	-0.023*	0.101*	-0.259*	-0.045*	-0.613*	0.222*	-0.173*	0.008	1	
(13)	INDLEV	0.027*	0.031*	0.191*	0.126*	-0.057*	0.041*	0.202*	0.078*	-0.186*	0.091*	0.036*	-0.082*	1

Table 3. ESG reputation risk and capital structure adjustment patterns: A univariate analysis

The table presents univariate analysis regarding capital structure adjustment patterns for firms high and low ESG reputation risk. High (low) ESG reputation risk is measured using the current RepRisk index where positive (zero) scores indicate high (low) reputation risk. Panel A presents the incidence of access by reporting the proportion of firms that accessed external capital markets, and how that access breaks down between debt (D.) and equity (E.), and between issuances (Issue) and retirements (Retire). Panel B provides the mean size of capital market access by reporting the magnitude of adjustments (scaled by total assets) either in the form of issuances or retirements. Internal capital adjustment denotes a positive change in retained earnings to total assets. Debt issue, debt retirement, and equity issue are each defined as a security issuance or repurchase of at least 5% of the book assets. Equity retirement is defined as a security repurchase of at least 1.25% of the book assets. *, **, and *** indicate significant difference between low and high ESG reputation risk at the 10%, 5%, and 1% levels, respectively.

	High vs. Low ESG reputation risk				
	Internal	D. Issue	D. Retire	E. Issue	E. Retire
	Panel A. Frequency of adjustments				
Low ESG reputation risk	0.595	0.429	0.401	0.110	0.106
High ESG reputation risk	0.576	0.472	0.438	0.070	0.165
Difference [High-Low]	-0.020	0.043	0.036	-0.041	0.059
Significance		***	***	***	***
	Panel B. Size of adjustments				
Low ESG reputation risk	1.741	0.116	0.090	0.038	0.006
High ESG reputation risk	0.292	0.112	0.091	0.018	0.010
Difference [High-Low]	-1.449	-0.004	0.001	-0.020	0.004
Significance		***		***	***

Table 4. ESG reputation risk and capital structure adjustment patterns: A multivariate analysis

This table presents estimation results from logistic regressions modeling the firm's decision to internally manage its capital structure or access to capital markets. High CRRI is a dummy variable calculated using the current RepRisk index where positive scores indicate high reputation risk. Internal capital adjustment denotes a positive change in retained earnings to total assets. Debt issue, debt retirement, and equity issue are each defined as a security issuance or repurchase of at least 5% of the book assets. Equity retirement is defined as a security repurchase of at least 1.25% of the book assets. The definitions and the sources of the control variables are provided in Appendix A. Robust standard errors are reported beneath the coefficient estimates. ∗, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Internal	D. Issue	D. Retire	E. Issue	E. Retire
	(1)	(2)	(3)	(4)	(5)
High CRRI	-0.021	-0.068***	-0.015	-0.272***	0.102***
	(0.021)	(0.024)	(0.025)	(0.039)	(0.037)
ROA	10.530***	-0.805***	0.776***	-0.725***	3.930***
	(0.165)	(0.096)	(0.101)	(0.095)	(0.214)
MB	-0.005	0.016***	0.010***	0.027***	0.010**
	(0.003)	(0.003)	(0.003)	(0.004)	(0.005)
DEP	-1.857***	-6.891***	10.114***	-11.843***	-1.891
	(0.678)	(0.713)	(0.710)	(0.825)	(1.224)
SIZE	-0.406***	0.674***	0.394***	0.065**	0.052
	(0.021)	(0.024)	(0.024)	(0.027)	(0.038)
TANG	-0.163	0.415***	0.299**	0.084	0.180
	(0.121)	(0.135)	(0.139)	(0.151)	(0.263)
R&D	-0.962	-5.059***	-2.283***	-1.933**	3.961***
	(0.740)	(0.841)	(0.841)	(0.765)	(1.102)
R&DD	-0.039	0.078*	0.093**	-0.297***	0.146**
	(0.035)	(0.040)	(0.042)	(0.062)	(0.064)
TAX	0.092***	-0.017	0.001	-0.007	0.095**
	(0.022)	(0.025)	(0.026)	(0.038)	(0.039)
CASH	0.662***	-2.047***	-2.648***	1.662***	0.387*
	(0.120)	(0.141)	(0.148)	(0.156)	(0.205)
CAPX	-0.117	5.864***	-1.438***	-0.004	1.234***
	(0.193)	(0.253)	(0.246)	(0.009)	(0.446)
Fixed effects	YES	YES	YES	YES	YES
Estimated odds ratios	0.980	0.934	0.985	0.762	1.107
Implied change in the odds	-0.020	-0.066	-0.015	-0.238	0.107

Table 5. ESG reputation risk and Leverage SOA: Main Results

This table reports the OLS regression results for the impact of ESG reputation risk (measured by CRRI and PRRI) on the speed of leverage adjustment (SOA). The dependent variable is the actual leverage adjustment (ΔLEV). All independent variables are multiplied by the leverage deviation from the target (DLEV). CRRI is current RepRisk index. PRRI is the current peak RepRisk index, which is calculated by maximizing CRRI in a given year. Firm-, industry-, and country-level variables, including ROA, MB, DEP, SIZE, TANG, R&D, R&DD, TAX, INDLEV, INFL, GGDP, MCAP are controlled in each regression. The variable definitions are in Appendix A. In columns (2), (3), (5) and (6), under-levered (over-levered) represents firm-years with leverage below (above) target leverage. Standard errors are bootstrapped and reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	ΔLEV					
Sample =	Full	Under-Levered	Over-Levered	Full	Under-Levered	Over-Levered
	(1)	(2)	(3)	(4)	(5)	(6)
CRRI	-0.154***	-0.300***	-0.085			
	(0.021)	(0.022)	(0.072)			
PRRI				-0.048***	-0.164***	-0.110**
				(0.017)	(0.020)	(0.047)
ROA	0.058***	-0.086***	-0.001	0.057***	-0.088***	-0.001
	(0.021)	(0.019)	(0.032)	(0.020)	(0.018)	(0.029)
MB	-0.000	0.000	-0.013***	-0.000	0.000	-0.013***
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.003)
DEP	-0.237*	0.309***	-0.138	-0.247**	0.294***	-0.141
	(0.128)	(0.097)	(0.283)	(0.118)	(0.100)	(0.248)
SIZE	0.017***	0.025***	0.005***	0.016***	0.025***	0.006***
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)
TANG	-0.019	0.033**	-0.006	-0.016	0.037**	-0.007
	(0.013)	(0.014)	(0.040)	(0.014)	(0.014)	(0.039)
R&D	0.203**	0.354***	0.298	0.204**	0.353***	0.289
	(0.085)	(0.093)	(0.253)	(0.086)	(0.084)	(0.201)
R&DD	-0.015**	-0.002	0.044**	-0.014**	-0.001	0.043***
	(0.006)	(0.006)	(0.018)	(0.006)	(0.006)	(0.016)
TAX	-0.017**	-0.008	-0.032**	-0.017***	-0.009	-0.032**
	(0.007)	(0.008)	(0.016)	(0.006)	(0.007)	(0.015)
LIQUID	0.209***	0.230***	0.107**	0.218***	0.239***	0.105**
	(0.014)	(0.014)	(0.054)	(0.013)	(0.012)	(0.049)
INDLEV	1.015***	0.661***	0.114	1.030***	0.677***	0.098
	(0.060)	(0.050)	(0.130)	(0.055)	(0.052)	(0.109)
INFL	0.001	0.008***	-0.003	0.002	0.008***	-0.003
	(0.001)	(0.002)	(0.004)	(0.002)	(0.001)	(0.003)
GGDP	1.112***	0.614***	0.502*	1.147***	0.668***	0.518*
	(0.136)	(0.172)	(0.298)	(0.133)	(0.114)	(0.305)
MCAP	-0.003*	0.005***	-0.006**	-0.002*	0.005***	-0.006**
	(0.001)	(0.001)	(0.003)	(0.001)	(0.001)	(0.003)
N	97,020	57,660	39,360	97,020	57,660	39,360
Adj. R^2	0.514	0.652	0.011	0.513	0.651	0.012

Table 6. Instrumental variable approach

This table reports the regression results for the effect of ESG reputation risk on the leverage SOA using Instrumental Variable (IV) approach. The instrument is the mortality rate from air pollution (which is collected from World Health Organization). In the first stage, we regress ESG reputation risk variables on the instrument and set of control variables. In the second stage, we use the fitted values of reputation risk to repeat our main analysis. Columns (1) and (3) present the first-stage regression results, while the second-stage regression results are reported in columns (2) and (4). The control variables are the same as those in Table 5. The reported t-statistics (in parentheses) are based on bootstrapped standard errors. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	1st- stage	2nd-stage	1st- stage	2nd-stage
Dep. Var. =	CRRI	ΔLEV	PRRI	ΔLEV
	(1)	(2)	(3)	(4)
CRRI		-3.624***		
		(0.307)		
PRRI				-2.960***
				(0.224)
ROA	-0.012***	0.080***	-0.017***	0.075***
	(0.002)	(0.026)	(0.003)	(0.019)
MB	0.001***	0.003***	0.002***	0.004***
	(0.000)	(0.001)	(0.000)	(0.001)
DEP	0.102***	0.012	0.150***	0.094
	(0.020)	(0.110)	(0.028)	(0.106)
SIZE	0.011***	0.042***	0.015***	0.047***
	(0.000)	(0.002)	(0.000)	(0.002)
TANG	-0.024***	-0.121***	-0.036***	-0.140***
	(0.004)	(0.017)	(0.005)	(0.021)
R&D	0.031*	0.145	0.040*	0.161*
	(0.016)	(0.100)	(0.022)	(0.095)
R&DD	-0.001	-0.041***	-0.000	-0.036***
	(0.002)	(0.006)	(0.002)	(0.006)
TAX	-0.000	-0.011*	-0.001	-0.014**
	(0.001)	(0.006)	(0.001)	(0.006)
LIQUID	-0.061***	-0.052*	-0.085***	-0.086***
	(0.004)	(0.028)	(0.005)	(0.032)
INDLEV	-0.042***	0.496***	-0.043**	0.516***
	(0.013)	(0.071)	(0.018)	(0.070)
INFL	0.001***	-0.012***	0.001***	-0.014***
	(0.000)	(0.002)	(0.000)	(0.002)
GGDP	0.090***	0.425**	0.166***	0.406**
	(0.019)	(0.174)	(0.027)	(0.168)
MCAP	0.004***	-0.031***	0.006***	-0.030***
	(0.001)	(0.006)	(0.001)	(0.005)
Mortality rate	-0.031***		-0.043***	
	(0.002)		(0.002)	
N	93,840	93,840	93,840	93,840
Adj. R^2	0.121	0.516	0.103	0.516

Table 7. Quasi-experimental analysis

This table tests the effect of ESG scandals on the relationship between reputation risk and leverage SOA using the following model.

$$\Delta LEV_{i,j,t+1} = \alpha_0 + (\alpha_1 RRI_{i,j,t} + \alpha_2 RRI_{i,j,t} \times Event_{i,j,t} + \alpha_3 Event_{i,j,t} + \eta X_{i,j,t}) \times DLEV_{i,j,t} + \delta_{i,j,t+1}$$

The differences-in-differences (DiD) estimator is the coefficient on $RRI_{i,j,t} \times Event_{i,j,t} \times DLEV_{i,j,t}$. In columns (1)-(2), Event is a dummy variable that equals one if a firm operates in Oil & Gas industry in the year 2010, zero otherwise. In columns (3) and (4), Event is a dummy variable that equals one for German firms in the year 2015, and zero otherwise. The control variables are the same as in Table 5. Standard errors are bootstrapped and reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	ΔLEV			
Event =	2010 Deepwater Horizon oil spill		2015 Volkswagen emissions scandal	
	(1)	(2)	(3)	(4)
CRRI	-0.153***		-0.153***	
	(0.027)		(0.023)	
CRRI × *Event*	-0.474*		-0.363*	
	(0.283)		(0.212)	
PRRI		-0.046**		-0.047***
		(0.018)		(0.016)
PRRI × *Event*		-0.716**		-0.564**
		(0.283)		(0.238)
Event	-0.398***	-0.341***	-0.659***	-0.603***
	(0.104)	(0.085)	(0.057)	(0.082)
Controls	YES	YES	YES	YES
N	97,020	97,020	97,020	97,020
Adj. R^2	0.514	0.514	0.514	0.514

Table 8: ESG reputation risk and operating performance

This table presents regressions of various measures of performance using the specification.

$$Outcome_{i,j,t} = \alpha_0 + \alpha_1 CRRI_{i,j,t} + \eta X_{i,j,t} + Fixed\ effects + \delta_{i,j,t}$$

The performance measures are: *Gross Margin*, measured as (sales – cost of goods sold) / sales; *ROA*, measured as operating income to assets; Selling, General & Administrative *(SG&A)* Expense divided by Assets; Accounts *Receivable* divided by Sales; and *Sales Growth*. In all models, we include country, industry, and year fixed (CIY) effects. Robust standard errors reported in parentheses are clustered at firm level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Gross Margin	*ROA*	*SG&A / Assets*	*Receivable / Sales*	*Sales Growth*
	(1)	(2)	(3)	(4)	(5)
CRRI	-0.249***	-0.175***	0.137***	0.088***	-0.069***
	(0.035)	(0.011)	(0.013)	(0.023)	(0.022)
MB	0.001	0.004***	0.001**	0.002**	0.007***
	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)
DEP	3.569***	-0.542***	1.336***	-2.625***	-2.299***
	(0.278)	(0.068)	(0.077)	(0.131)	(0.142)
SIZE	0.065***	0.039***	-0.038***	-0.035***	-0.022***
	(0.004)	(0.001)	(0.001)	(0.002)	(0.002)
TANG	-0.068	0.049***	-0.123***	-0.234***	0.053***
	(0.041)	(0.008)	(0.010)	(0.023)	(0.021)
R&D	1.469***	-1.045***	1.511***	0.090	0.495***
	(0.148)	(0.081)	(0.059)	(0.079)	(0.130)
R&DD	0.023**	-0.002	0.004	0.003	0.013**
	(0.011)	(0.002)	(0.003)	(0.005)	(0.006)
TAX	0.037***	0.026***	0.002	-0.028***	-0.011**
	(0.004)	(0.001)	(0.002)	(0.003)	(0.005)
CASH	-0.078*	-0.017	0.023*	-0.305***	0.120***
	(0.047)	(0.012)	(0.012)	(0.023)	(0.027)
CAPX	0.002	0.001	0.038**	-0.000	0.008***
	(0.001)	(0.002)	(0.016)	(0.000)	(0.001)
INFL	0.001	0.002***	-0.001***	-0.003**	0.001
	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)
GGDP	-0.143	0.042	0.063	-0.297***	-0.019
	(0.131)	(0.044)	(0.054)	(0.105)	(0.132)
MCAP	-0.008***	-0.002*	0.002	0.003	0.005**
	(0.003)	(0.001)	(0.001)	(0.003)	(0.002)
Fixed Effects	CIY	CIY	CIY	CIY	CIY
N	72,301	78,727	63,876	72,531	62,143
Adj. R^2	0.268	0.311	0.545	0.237	0.074

Table 9. Competitive advantages

This table reports the channel through which ESG reputation risk affects the leverage SOA: decreased competitive advantages. The dependent variable is a firm's change in book leverage. We measure competitive advantages using three different proxies: Return on Invested Capital (ROIC), Brand Value, and Herfindahl-Hirschman Index (HHI). *ROIC* is the profitability ratio. *Brand Value* represents the net book value of brands, patents and trademarks. *HHI* is calculated as the sum of the squared market shares using firm sales, based on four-digit (SIC) Industry classification. The cross-sectional variables (*Advantages*) are dummy variables indicating the above-median value of variables shown in the column headings. All independent variables are multiplied by the leverage deviation from the target (DLEV). The variable definitions are in Appendix A. The control variables are the same as those in Table 5. The reported t-statistics (in parentheses) are based on bootstrapped standard errors. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	ΔLEV					
Advantages =	ROIC		Brand Value		HHI	
	(1)	(2)	(3)	(4)	(5)	(6)
CRRI	0.037		0.211		0.032	
	(0.072)		(0.167)		(0.056)	
CRRI × *Advantages*	-0.139*		-0.288*		-0.180**	
	(0.080)		(0.175)		(0.079)	
PRRI		0.048		0.114		0.024
		(0.060)		(0.106)		(0.047)
PRRI × *Advantages*		-0.136**		-0.183*		-0.125**
		(0.067)		(0.105)		(0.057)
Advantages	0.006	0.012	0.033*	0.036	0.025	0.027*
	(0.013)	(0.017)	(0.020)	(0.024)	(0.017)	(0.014)
Controls	YES	YES	YES	YES	YES	YES
N	73,843	73,843	22,454	22,454	79,035	79,035
Adj. R^2	0.514	0.514	0.514	0.514	0.514	0.514

Table 10. Capital raising

This table reports the results for the effect of ESG reputation risk on the speed of leverage adjustment (SOA) conditional on capital raising. The dependent variable is a firm's change in book leverage. Capital raising is proxied by the ease of access to equity and debt markets and statutory financial constraints. Following Öztekin and Flannery (2012), we define *Equity Access* as the first principal component of shareholder rights and shareholder right enforcement; *Debt Access* as the first principal component of creditor rights and creditor right enforcement; and *Financial Constraints* as the first principal component of mandatory dividends and legal reserve. The cross-sectional variables (*Access*) are dummy variables indicating the above-median value of variables shown in the column headings. All independent variables are multiplied by the leverage deviation from the target (DLEV). The variable definitions are in Appendix A. The control variables are the same as those in Table 5. The reported t-statistics (in parentheses) are based on bootstrapped standard errors. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	ΔLEV					
Access =	Equity Access		Debt Access		Financial Constraints	
	(1)	(2)	(3)	(4)	(5)	(6)
CRRI	0.040		-0.042		-0.231***	
	(0.043)		(0.045)		(0.035)	
CRRI × *Access*	-0.238***		-0.118**		0.447***	
	(0.057)		(0.057)		(0.054)	
PRRI		0.064**		0.011		-0.108***
		(0.029)		(0.030)		(0.022)
PRRI × *Access*		-0.136***		-0.069*		0.291***
		(0.033)		(0.036)		(0.043)
Access	0.006	0.004	-0.030***	-0.032***	-0.011	-0.011
	(0.009)	(0.008)	(0.008)	(0.010)	(0.008)	(0.010)
Controls	YES	YES	YES	YES	YES	YES
N	82,300	82,300	82,300	82,300	82,300	82,300
Adj. R^2	0.482	0.482	0.483	0.482	0.483	0.483

Table 11. Firm reputation

This table reports the results for the effect of ESG reputation risk on the speed of leverage adjustment (SOA) conditional on the degree of firm reputation. *Media Coverage* (obtained from RavenPack database) is total number of news articles about a firm in a given year. *Analyst Coverage* (obtained from I/B/E/S) is number of financial analysts covering a firm. *Market Value* is defined as market value of total assets. Firms that are covered by great number of media and analyst and have high market value (defined by the sample median) are considered highly reputable. The cross-sectional variables (*Reputation*) are dummy variables indicating the above-median value of variables shown in the column headings. All independent variables are multiplied by the leverage deviation from the target (DLEV). The variable definitions are in Appendix A. The control variables are the same as those in Table 5. The reported t-statistics (in parentheses) are based on bootstrapped standard errors. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	ΔLEV					
Reputation=	Media Coverage		Analyst Coverage		Market Value	
	(1)	(2)	(3)	(4)	(5)	(6)
CRRI	-0.131***		-0.018		0.082*	
	(0.037)		(0.042)		(0.045)	
CRRI × *Reputation*	-0.116***		-0.230***		-0.321***	
	(0.045)		(0.060)		(0.056)	
PRRI		-0.055**		0.036		0.082***
		(0.026)		(0.030)		(0.025)
PRRI × *Reputation*		-0.056**		-0.158***		-0.206***
		(0.028)		(0.038)		(0.034)
Reputation	0.028***	0.026***	-0.012	-0.012	0.007	0.007
	(0.008)	(0.008)	(0.009)	(0.008)	(0.007)	(0.006)
Controls	YES	YES	YES	YES	YES	YES
N	64,629	64,629	65,960	65,960	97,019	97,019
Adj. R^2	0.597	0.597	0.553	0.553	0.514	0.514

Table 12. Social norms

This table reports the results for the effect of ESG reputation risk on the speed of leverage adjustment (SOA) conditional on the social norms of ESG issues. *Public Awareness* is calculated as the mean rank score of the following two variables: (1) Number of non-government organizations (NGOs), which is collected from UN, per million population, and (2) total number of CSR reports (collected from Datastream) issued by firms divided by millions in population in each country. *Environmental Protection* is the degree to which individuals in a country prioritize the types of activities associated with the natural environment, obtained from World Value Survey item "Protecting environment vs. Economic growth". *Business Commitment* is the ASSET4's ESG combined score. The cross-sectional variables (*Norms*) are dummy variables indicating the above-median value of variables shown in the column headings. All independent variables are multiplied by the leverage deviation from the target (DLEV). The variable definitions are in Appendix A. The control variables are the same as those in Table 5. The reported t-statistics (in parentheses) are based on bootstrapped standard errors. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	ΔLEV					
Norms =	Public Awareness		Environmental Protection		Business Commitment	
	(1)	(2)	(3)	(4)	(5)	(6)
CRRI	-0.130***		0.216***		-0.183***	
	(0.025)		(0.081)		(0.056)	
CRRI × *Norms*	-0.478***		-0.389***		-0.153**	
	(0.071)		(0.127)		(0.060)	
PRRI		-0.036*		0.123**		-0.081**
		(0.020)		(0.059)		(0.040)
PRRI × *Norms*		-0.400***		-0.263***		-0.155***
		(0.049)		(0.078)		(0.057)
Norms	-0.415***	-0.403***	0.070***	0.073***	-0.012	-0.006
	(0.014)	(0.014)	(0.024)	(0.019)	(0.009)	(0.013)
Controls	YES	YES	YES	YES	YES	YES
N	93,840	93,840	47,965	47,965	35,285	35,285
Adj. R^2	0.531	0.531	0.110	0.110	0.673	0.673

Table 13. Institutional environments

This table reports the results for the effect of ESG reputation risk on the speed of leverage adjustment (SOA) conditional on the institutional environments. Rule of law (*RLAW*) refers to the idea that the same rules, standards and principles need to apply to all individuals and organizations, including to government itsel. Regulatory quality index (*RQUALITY*) captures investors' perceptions of the government's ability to formulate and implement sound policies and regulations that permit and promote private sector development. Voice and Accountability index (*VOICE*) reflects perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media. A country with high RLAW, RQUALITY, and VOICE is considered as good institutional environments. The cross-sectional variables (*Ins_Env*) are dummy variables indicating the above-median value of variables shown in the column headings. All independent variables are multiplied by the leverage deviation from the target (DLEV). The variable definitions are in Appendix A. The control variables are the same as those in Table 5. The reported t-statistics (in parentheses) are based on bootstrapped standard errors. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	ΔLEV					
Ins_Env =	RLAW		RQUALITY		VOICE	
	(1)	(2)	(3)	(4)	(5)	(6)
CRRI	-0.070***		-0.021		0.026	
	(0.025)		(0.042)		(0.048)	
CRRI × *Ins_Env*	-0.241***		-0.294***		-0.304***	
	(0.051)		(0.051)		(0.058)	
PRRI		0.001		0.066**		0.090***
		(0.019)		(0.028)		(0.023)
PRRI × *Ins_Env*		-0.133***		-0.251***		-0.256***
		(0.031)		(0.036)		(0.026)
Ins_Env	0.026***	0.026***	0.082***	0.089***	0.046***	0.052***
	(0.007)	(0.007)	(0.006)	(0.007)	(0.010)	(0.008)
Controls	YES	YES	YES	YES	YES	YES
N	97,020	97,020	97,020	97,020	97,020	97,020
Adj. R^2	0.514	0.514	0.515	0.514	0.514	0.514