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ESG Shareholder Engagement and Downside Risk

Finance Working Paper N° 671/2020
September 2023

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Keywords: ESG, Shareholder Activism, Downside Risk, Corporate Governance, Climate Change

JEL Classifications: G32, M14

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1. Introduction

Institutional investor engagement on environmental, social, and governance (ESG) issues has become increasingly prevalent in financial markets. A primary goal of these engagements is to engender higher standards of corporate ESG practices that serve as an insurance mechanism against harmful, risk-inducing events as well as mitigating the likelihood of regulatory, legislative or consumer actions against the firm. Several factors contribute to this trend, including the increased public interest in ESG issues, the growing size and importance of institutional shareholdings, and the still relatively low passing rates for shareholder proxy proposals on many of the ESG issues of importance to institutional investors.[1]

In this paper we examine the relationship between investor engagement of a portfolio firm and the firm's subsequent downside risk. Downside risks can be particularly important for a number of investors. For example, pension funds face large liabilities towards their beneficiaries and the failure of their assets to meet those liabilities carries significant penalties (Ang, Chen, and Sundaresan, 2013). Thus, such investors face downside risk constraints. The importance of downside risk for banks and insurance companies is reflected in the fact that regulatory capital requirements include calculations based on downside risk measures, usually value-at-risk measures. Evidence also suggests that mutual fund managers and their shareholders consider downside risk in their investment decisions (Bodnaruk, Chokaev, and Simonov, 2019; Artavanis, Eksi, and Kadlec, 2019). Finally, while standard mean-variance investors would be more focused on volatility than downside risks, key assumptions in this framework are violated in practice. For example, although the mean-variance framework relies on the assumption that asset returns are jointly normally distributed, empirical evidence shows that returns are typically skewed, suggesting downside risk as an additional

[1] See Gillan and Starks (2000; 2007) or Grewal, Serafeim, and Yoon (2016).

consideration.[2]

To examine whether shareholder engagements on ESG issues can result in downside risk reductions, we employ proprietary engagement data provided by a large institutional investor based in the UK. This investor is considered to be one of the most influential activists when it comes to promoting the development of higher ESG standards at portfolio firms. The investor not only has the weight of its own holdings, but also speaks on behalf of other large institutional investors for whom it conducts engagement activities. The institution's assets under advisement exceed $1 trillion by the end of 2020. The investor primarily employs a private, nonpublic, approach to engage the portfolio firms, consistent with the more general evidence on institutional investor engagement in McCahery, Sautner, and Starks (2016).

Our data include 1,443 engagements across 485 targeted firms worldwide which the investor initiated during the 2005 to 2018 sample period. The investor provided us with full access to the engagement database, including shareholdings, engagement activities, action reports, and the investor's measures of engagement success. The measure of engagement success consists of four milestones (M): i) the investor raises a concern with a target (M1); ii) the target acknowledges the concern that was raised (M2); iii) the target takes actions to address the concern (M3); and iv) the investor successfully completes the engagement (M4). Out of all engagements in our sample, 33% successfully achieve all four milestones by the end of the sample period, 19% achieve M3, and 30% reach M2.

The investor most commonly engages firms regarding governance issues, which

[2] See Harlow and Rao (1989), Harvey and Siddique (2000) or Ang, Chen, and Xing (2006). Even Markowitz (1959) considered investors to be mean-semi-variance rather than mean-variance optimizing. Referring to semi-variance, a downside risk measure, as "S" and to variance as "V" Markowitz (1959: 193-194) explains that *"analyses based on S tend to produce better portfolios than those based on V. Variance considers extremely high and extremely low returns equally undesirable. An analysis based on V seeks to eliminate both extremes. An analysis based on S, on the other hand, concentrates on reducing losses."*

account for 51% of the sample engagements and frequently center on executive pay and board structure. The next most common engagement type (26%) consists of those that relate to environmental issues with a primary focus on climate risk, which has become an important engagement topic among institutional investors (Krueger, Sautner, and Starks, 2020; Ilhan et al., 2023). The third most common engagement type covers social issues (23%), with three primary concerns: health and safety, supply chain, and illegal acts (e.g., bribery and corruption).

While engagements on environmental and social issues could be expected to reduce downside risk due to lower probabilities of harmful risk-inducing events, it is less obvious why engagements on governance issues should result in decreased downside risks. In fact, one may argue the opposite: such engagements could be intended to *increase* risk-taking if undiversified managers take too little risk compared to what is optimal for diversified shareholders.[3] In our setting, however, some governance engagements can reduce downside risks that originate from illegal activities or fraud, and risk reductions from such engagements are in the interest of shareholders. To illustrate, the investor's engagements to increase the independence of the audit or risk committee has the potential to reduce downside risks related to accounting fraud. Likewise, engagements to increase the holding period of equity-based pay should lower incentives to manipulate short-term earnings. However, not all governance engagements would be expected to reduce downside risk. For example, the investor's governance engagements that address issues related to increasing the CEO's pay-for-performance sensitivity do not have a clear expectation of affecting downside risks.[4]

To examine whether the investor's ESG engagement activities reduce the portfolio

[3] For example, Gormley and Matsa (2016) show that poor governance (the adoption of antitakeover laws in their setting) causes managers to inefficiently reduce stock volatility and the risk of distress.

[4] This difference in the investor's risk goals for governance engagements may explain why in the subsequent analyses we find that governance engagements, on average, do not reduce downside risks.

firms' downside risks, we employ two measures that reflect the potential wealth-protection motives of ESG engagements: (1) the target firm's value at risk (VaR) (Duffie and Pan, 1997);[5] and (2) the lower partial moment (LPM) of the second order (Bawa, 1975; Fishburn, 1977), which captures *negative* return fluctuations. Using these measures, we employ the Gormley and Matsa (2011) stacked regression approach to estimate the changes in firms' downside risks from before to after the engagements, relative to a control group of matched firms, where matches are based on the country of the headquarters location, industry, and size. We employ the stacked regression approach, rather than staggered difference-in-differences (DiD) regressions, to avoid potential bias because of heterogeneous treatment effects or variation in treatment timing. Such bias could originate from previously targeted firms acting (implicitly) as control firms for firms that are targeted at later points in time (see Baker, Larcker, and Wang, 2022).[6]

Using monthly data for the downside risk measures over two-year windows surrounding the investor's initial engagement, we find the investor's engagements to be associated with subsequent reductions in the target firms' downside risk. These effects are driven by the engagements classified as successful, that is, at least M2 is achieved. We find the VaR declines by 0.205 from before to after the engagement, which is economically significant (9% relative to the standard deviation). The magnitude of the risk reduction effect increases if we impose a stricter definition of engagement success and consider only

[5] The value-at-risk measure should capture ESG risk because firms with better ESG performance become less vulnerable to firm-specific negative events (Krueger, 2015). Ilhan, Sautner, and Vilkov (2021) use options-implied measures of tail risks to measure downside risk. We cannot take this approach because our international sample contains few firms for which liquid out-of-the-money puts are available.

[6] We create, for each treatment event, an event-specific "cohort" dataset, whereby a cohort is defined by the firms (first) engaged in a given month (plus the corresponding matched firms). These datasets are then "stacked" together and a DiD regression is estimated using the stacked dataset, with cohort-specific fixed effects being added to the fixed effects structure.

engagements where at least M3 has been achieved (i.e., the target management has started to take actions). Notably, we do not detect a risk reduction effect of engagement for those targets where M2 is not achieved (the target does not acknowledge the existence of an issue), which is consistent with our hypothesis that the engagement has causal effects.

Next, we consider *which* engagement types are most effective in reducing downside risks by examining how the effects vary across the investor's ESG themes. Considering M2 and M3 as the success threshold, engagements over environmental topics—primarily over climate change—deliver the highest benefits in terms of risk reductions. This is consistent with the survey evidence in Krueger, Sautner, and Starks (2020) and Ilhan et al. (2023) that engagement over climate risk and climate risk disclosure is an important channel through which institutions try to tackle climate risks—our results suggest that such engagements can deliver substantial benefits for investors, by lowering the downside risk exposures. The environmental risk reductions we detect echo broader evidence that environmental risks have become salient and highly costly when they materialize. A recent example illustrating the tail risk character of environmental incidents is PG&E's climate-related bankruptcy in 2019.[7]

A central problem with measuring downside risk reductions in response to shareholder engagements is that its main effect might be to reduce the probability of a rare disaster. In this case it could be difficult to measure any effect during our sample period because the potential disaster would then not occur. However, the implication of this issue is that the downside risk reductions we measure would be a lower bound on the total downside risk reductions. Further, our evidence on the environmental risk reductions that we do capture is consistent with related evidence in the climate finance literature as detailed by the Giglio, Kelly, and Stroebel (2021) review. For example, Ilhan, Sautner, and Vilkov (2021) document the pricing of carbon-related tail risks between 2009 and 2016. Similarly, Barnett

[7] See "PG&E: The First Climate-Change Bankruptcy, Probably Not the Last," *Wall Street Journal*, January 18, 2019.

(2020) finds his climate policy event index to be more discriminating between firms with varying degrees of climate risk for the "climate policy-focused" period from 1996 to 2017 than for his entire sample period (1973-2017). More recently, Sautner et al. (2023) show that discussions about climate risks in earnings conference calls have increased sharply since 2011.

Finally, we provide evidence on a channel through which the observed engagement activities reduce downside risk. As the risk reductions we document originate primarily from environmental engagements, we focus on negative outcomes related to environmental incidents, which we measure using news-based data from RepRisk. We exploit within-target variation to identify whether the engagement-induced risk reductions relate to actual changes in environmental incidents. Specifically, we contrast the change in environmental incidents around the investor's engagement between targets with large versus small reductions in downside risk. We find large and highly significant decreases in the number of environmental risk incidents at target firms that exhibit large engagement-induced downside risk reductions. For such targets, the number of incidents declines by 26% from before to after the engagement. In contrast, we find no corresponding declines in environmental incidents among engagements where downside risks did not decrease by a large amount.

We contribute to the literature on investor engagement, and specifically ESG engagement in two primary ways. First, we provide evidence to support the hypothesis that intervention over ESG topics reduces downside risk. This finding complements work that focuses primarily on the effects of shareholder engagements on first moments, that is, firm values or returns (Smith, 1996; Carleton, Nelson, and Weisbach, 1998; Becht et al., 2009; Dimson, Karakaş, and Li, 2015; Barko, Cremers, and Renneboog, 2022; Becht, Franks and Wagner, 2023). Including risk as an outcome variable, Dimson, Karakaş, and Li (2015) find that stock return volatility decreases after successful ESG engagements. Second, our evidence relates to contemporaneous work by Akey and Appel (2020), Naaraayanan, Sachdeva, and Sharma (2021), and Chu and Zhao (2019), who demonstrate that environmental shareholder activism has real effects through emission reductions. Our results complement their evidence

by showing that activism can benefit shareholders through the lowering of downside risks.

2. Engagement Data and Process

2.1 Engagement Data

We obtain the engagement data from a large institutional asset manager in the UK who is considered to be highly influential through an active ownership strategy. The proprietary database contains 1,443 ESG engagements targeting 485 firms worldwide, covering the period between January 2005 and April 2018.[8] We have access to many details of the investor's engagement database, including the engagement reports, action reports, and success milestones.

Figures 1, 2, and 3 display the breakout of the engagements by geographic location, industry and year. Figure 1 shows that the investor engages firms across many countries, with the largest number of engagements targeting firms in the US (313 or 18% of the sample) and the UK (278 or 16%). These countries are followed by two large Asian economies (Japan with 104 engagements or 6%; South Korea with 70 or 4%), two continental European countries (France and Germany, each about 4%), and Brazil (3%). Figure 2 illustrates that the most prominent engagement sectors are Financials, Basic Materials, Consumer Goods, Oil & Gas, Industrials, and Consumer Services.[9] The sectors less environmentally exposed (Technology and Telecommunications) are less frequently targeted. Figure 3 shows that the investor gradually increased the intensity of engagements from 2005, reaching a peak with 200 engagements in 2010, and then conducting slightly lower numbers of engagements in the remaining years of the sample. Although the number of engagements per year decreases

[8] The investor also engages on "strategy" topics, which are not examined in this paper as our focus is on ESG engagements.

[9] In the figure, industries are classified based on one-digit FTSE Russell Industry Classification Benchmark (ICB) codes.

after the peak, the investor remains very active, commencing 170 and 139 engagements in 2016 and 2017, the last two complete sample years.

2.2 ESG Engagement Process

The investor has a stated goal of engaging firms to incorporate long-term sustainability and risk management into their business operations and corporate policies. The investor believes that firms with informed and involved shareholders are better able to manage risk and minimize the occurrence of tail risk events. The investor further states that the engagement process consists predominantly of a constructive, confidential dialogue, which is achieved with a team of more than 30 professionals who engage on behalf of the investor's own assets as well as on behalf of clients. These clients consist of more than 40 asset owners, the vast majority of which are public pension funds, and the assets represented by our investor exceed $1 trillion by the end of 2020.

In Table I we report the frequency of engagements across the ESG themes. The investor most commonly engages portfolio firms over governance issues, accounting for 51% of all engagements, followed by engagements on environmental (26%) and social issues (23%). This distribution mirrors the percentages of engagements by a different asset manager studied by Dimson, Karakaş, and Li (2015) who also find for their investor a greater frequency of governance engagements than engagements on environmental and social topics.

Among all environmental topics (Panel A), the investor focuses primarily on issues related to climate change (47%). The importance of climate-related topics in our sample is reflected by the fact that the number of such engagements (179) amounts to more than 85% of the number of engagements on the most common "traditional" engagement topic: executive compensation (206). This observation reflects a wider trend: Climate change has become an important engagement topic for many institutions, apparently caused by the their belief that climate risks have the potential to adversely affect the values of the assets they manage (Krueger, Sautner, and Starks, 2020). Additionally, many institutions find climate risks

difficult to price and hedge, making direct engagement, such as demanding robust climate disclosure or a reduction in emissions, an important risk-management tool. Beyond this financial motivation, climate-related issues may also be addressed for nonfinancial reasons based on the view that institutional investors have a responsibility to protect the planet. IA Table I shows that, across the investor's 179 climate engagements, 28% target a firm's carbon strategy and risk management, 27% aim to improve carbon disclosure, 25% strive to reduce a firm's carbon intensity, and 6% address stranded assets concerns.

In terms of social themes, as shown in Panel B of Table 1, the investor engages primarily over concerns regarding human rights (42%), labour rights (27%), and bribery and corruption (14%). These themes are similar to the social themes examined in Dimson, Karakaş, and Li (2015). Within the governance area (Panel C), the investor most frequently intervenes because of concerns over executive pay (28%), board independence (26%), board diversity (23%), and succession planning (12%). These concerns also reflect concerns of the broader institutional investor community, as shown in industry publications (Wilcox and Sodali, 2017) and in surveys (McCahery, Sautner, and Starks, 2016; Edmans, Gosling, and Jenter, 2022).

Table II, Panel A, reports the proportions of the engagements that reach each milestone by the end of the sample period. Across all categories of engagements, 30% achieve at least M2 (the target acknowledges the concern), 19% go one step further and achieve at least M3 (target takes actions to address the concern), and 33% reach M4 (engagement is successfully completed). Thus, according to these milestones, the engagements have been met with varying success rates.

While similar to the success rates in Dimson, Karakaş, and Li (2015), the success rates in our sample are lower than those reported by activist hedge funds, who engage in a different way and generally for different purposes (the hedge fund success rates are 60% in Brav et al., 2008 and 60% in Klein and Zur, 2011). One reason could be that it is harder to persuade top management and the board to incorporate the requested ESG changes as compared to requested financial changes (capital structure or dividend policy), which traditionally have

been the focus of activist hedge funds. Second, hedge funds typically target firms that are in need of the requested financial changes, and they bring other investors on board to lobby firm management for changes (Kedia, Starks, and Wang, 2021; Brav, Jiang, and Li, 2022).

Table II, Panel B, shows that it takes on average two months to complete M1, then an additional four months until a portfolio firm also acknowledges an issue raised by the investor (M2), and 18 additional months until the target has also taken actions or developed a strategy to improve an issue (M3). For those targets for which all milestones are successfully completed, the process takes 34 months, on average.[10] The table also shows variation across the engagement themes in the time it takes to complete the engagement milestones.

In IA Table II, Panel A, we report the "actions" taken by the investor to achieve the engagement goals. Among all actions, about 45% take the form of meetings, followed by substantive emails (18%), and conference calls (16%). M1 and M2 can be completed, on average, with one or two meetings per engagement, while it takes an average of three meetings to achieve M3 and five meetings to achieve M4. Moving from M2 to M3, and especially from M3 to M4, are the more difficult steps, requiring a larger number of meetings, emails, calls, and letters. IA Table II, Panel B, shows that the investor has dialogues over social and environmental topics mostly with senior executives, whereas the investor tends to communicate most with the board and the chairperson over governance issues.

3. ESG Downside Risk Reduction

3.1 Downside Risk Measures

Downside, or left-tail risk, is an important consideration in asset pricing, particularly given

[10] These rates can be compared to Becht et al. (2009) who find that collaborative corporate governance engagements take 16 months, whereas confrontational ones take 43 months. Brav et al. (2008) find that the average duration of an engagement undertaken by a hedge fund is 12 months.

that the distribution of stock returns can be characterized by skewness and heavy tails.[11] In this case, risk measures, such as volatility that do not distinguish between positive and negative outcomes, may be uninformative, while downside risk measures better capture investors' perceptions of risk (Harlow, 1991). Moreover, as argued earlier, many institutional investors have a natural focus on left-tail risk due to their business interests or because of regulation. Thus, if downside risk is an important consideration for ESG engagement outcomes, we would expect a relationship between successful ESG engagements and subsequent changes in measures of firms' downside risks.

We employ two widely used measures to identify downside risk. As a first measure, we calculate a firm's value at risk (*VaR*) (Duffie and Pan, 1997). We measure *VaR* at the firm-month level by calculating daily return outcomes ranked in the bottom fifth percentile (5%-VaR). We use absolute values such that smaller numbers reflect less downside risk.

Our second measure, the second-order lower partial moment (*LPM*), captures the distribution of returns that fall below 0%, that is, we consider the negative return part of the distribution. *LPM* is calculated as the square root of the semi-variance below 0% (Bawa, 1975; Fishburn, 1977):

$$LPM = \sqrt{\frac{1}{N_1 - 1}\sum_{i=1}^{N_1}(r_{n,i} - \overline{r_{n,i}})^2}$$

where $r_{n,i}$ indicates the negative return of firm *i* and $\overline{r_{n,i}}$ is the mean value of $r_{n,i}$. N_1 is the number of observed *negative* returns for firm *i* during the measurement period. We calculate the measure at the firm-month level from daily (log) stock return data.

[11] See Bawa (1975), Bawa and Lindenberg (1977), Singleton and Wingender (1986), Harlow and Rao (1989), and more recently, Harvey and Siddique (2000) or, Ang, Chen, and Xing (2006).

3.2 Risk Reduction Effects: Empirical Tests of ESG Engagement

3.2.a Empirical Methodology

In the risk analysis we exclude 57 targets in the utilities and health sectors from the full sample of 485 firms as they operate in heavily regulated environments where activists have lower chances to affect change over the horizon we consider in this paper (some of the engagements may require legislative changes as well). We lose 51 firms for which we cannot find a match in the FTSE All-World index and 98 firms for which there is missing data on the control variables. Our final sample for the risk analysis in turn contains 279 target firms matched to the same number of control firms.

To test whether ESG engagements are related to subsequent downside risk reduction, we compare the downside risk of engagement targets before and after the engagement, relative to a matched control group. We estimate changes in downside risk at the firm-month level over the two-sided 24-months window around the date in which a target is first engaged by the investor. We match each targeted firm to one control firm based on the headquarters country, industry, and size. We match one-to-one, instead of one-to-N, to avoid bias originating from risk diversification benefits of a portfolio of N control firms. Targeted firms do not act as matched control firms for firms that are later targeted. To identify control firms, we use the initial engagement date and search for a control firm in the FTSE All-World index (the index covers about 95% of the world's investable market capitalization and includes more than 4,000 firms from nearly 50 countries). Matching by country is important because ESG regulations and ESG performance vary across countries. (We replace country by region in 16 cases where a firm is unique in its industry and size bracket within its country.) We match by industry, using two-digit FTSE Russell ICB codes, as downside risk itself may vary across industries and an engagement may be more successful in industries with recent ESG

scandals.[12] Finally, we match on size as ESG incidents may have more adverse reputational effects for larger firms—they tend to be more salient to investors or customers—, and as large firms respond more positively to shareholder activists (Dimson, Karakaş, and Li, 2015). As discussed in detail below, our matching implicitly assumes that the targeted firms and their matched counterparts would follow similar trends in downside risk in the absence of engagement.

Baker, Larcker, and Wang (2022) show that when, as in our case, treatment is rolled out in a staggered way, estimates from DiD regressions can be biased because of heterogeneous treatment effects and variation in treatment timing. The specific concern in our setting is that previously targeted firms may act as (implicit) control firms for firms that are later targeted. Staggered DiD estimates would therefore build on both "good" comparisons between treated and not-yet-treated firms as well as "bad" comparisons between treated and already-treated firms. This can lead to a violation of the parallel trends assumption. One way to address bias originating from such "bad" comparisons is to use a stacked regression approach as in Gormley and Matsa (2011). The idea behind this approach is to create, for each treatment event, an event-specific "cohort" dataset, whereby a cohort is defined by the firms (first) engaged in a given month plus the corresponding matched firms (these matched firms are never engaged). These datasets are then "stacked" together and the DiD regression is estimated using the stacked dataset, with cohort-specific fixed effects being added to the fixed effects structure. Using the two-sided 24-months window around the engagement date, the stacked regression estimates for firm *i* of cohort *c* and month *t* results in the following regression:

$$Downside\ Risk_{c,i,t} = \alpha + \beta_1\, Target_{c,i} \times Post_{c,t} + \beta_2\, \boldsymbol{X}_{c,i,t-12} + Fixed\ Effects + \varepsilon_{c,i,t}, \qquad (1)$$

[12] Consistent with this conjecture, Dimson, Karakaş, and Li (2021) find that the success rate in their sample varies across industries.

where *Downside Risk* represents one of the two measures of downside risk (*VaR* or *LPM*); *Target* equals 1 for all firm-month observations if firm *i* is a target in cohort *c*, and 0 if it is a matched firm; and *Post* equals 1 for all firm-month observations in cohort *c* after firm *i* has been targeted in month *t*, and 0 before.[13] The vector ***X*** contains control variables that may affect downside risks beyond shareholder engagement, measured with a lag of one year (not all variables are available for all firm-months). Following Gormley and Matsa (2011) and the advice in Baker, Larcker, and Wang (2022), we also estimate a variant of the stacked regression model that excludes the control variables. We include industry-by-year fixed effects and country fixed effects, which we interact with cohort fixed effects. We account for cohort-specific treatment and time effects by interacting *Post* and *Target* with the cohort fixed effects (individual effects for *Post* and *Target* are absorbed by these fixed effects). Industries are again classified at the two-digit FTSE Russell ICB codes level. Summary statistics of the variables used in the regression analysis are reported in Table III.

The identifying assumptions underlying the estimation as well as identification threats are discussed in Section 3.3.

3.2.b Overall Effects of ESG Engagement on Downside Risk

In Table IV we report the estimates of Equation (1) to understand the effects of shareholder engagement on downside risk. Columns 1 to 4 display results for *VaR* and Columns 5 to 8 report results for *LPM.* We present in Columns 1 and 5 estimates of the overall effects of ESG engagement on *VaR* and *LPM*, and in the remaining columns the results separated by engagement success. We consider two definitions of engagement success. The first definition in Columns 2 and 6 classifies as successful those cases where, at the minimum, the target

[13] The post-engagement window was reduced from 24 to 21 months for two firms, a target firm and its matched control firm, because the target's shares were suspended from trading because of an event unrelated to the specific engagement (a delayed disclosure of the audited financial statement).

acknowledges an issue of concern raised by the investor (i.e., at least M2 has been achieved). The second definition, applied in Columns 3 and 7, is stricter and requires that the target not only acknowledges the issue but takes actions to address it (at least M3 is reached).[14] As we estimate regressions at the firm-month level—rather than the firm-engagement-month level, we need to create a measure of engagement success in the case of multiple overlapping engagements. In such cases, we calculate the average engagement success rate across the engagements and require the *average* milestone to exceed 2 or 3, respectively.[15]

Columns 1 and 5 demonstrate that on average across all engagements, whether successful or not, downside risk decreases at targeted firms from before to after the engagement, relative to the control group. Importantly, the magnitude of the effects sharply increases if we condition on engagement success in Columns 2, 3, 6, and 7. Specifically, Columns 2 and 6 show that ESG engagements significantly reduce downside risk among those engagements where at least M2 is achieved, that is, among targets that acknowledged the existence of an ESG issue or responded with actions to the investor's demands. The estimate in Column 2 for *VaR* implies that the downside risk of targets decreases by 0.205 after the engagement, relative to the control firms; these risk reductions correspond to about 9% of the variable's standard deviation. As shown in Column 6 we obtain similar results with *LPM* as the measure of downside risk, both in terms of statistical and economic significance (the effect equals 8% of the standard deviation).

[14] The classification of success implies a reduction in the sample size used for the estimation, especially when we consider M3 (which has the benefit of allowing us to cleanly identify effects of successful engagements).

[15] We calculate this average success rate as the sum of the milestones achieved, coding as 1 if M1 has been achieved, 2 for M2, etc., and divide the sum of these milestones by the number of engagements. For example, in case the investor reached at one target firm M2 for one engagement and M3 for another engagement with the respective firm, the average success rate would be (M) 2.5. This procedure is in line with the approach taken by Dimson, Karakaş, and Li (2015), who use a different investor's data in their analysis.

In Columns 3 and 7 we impose a stricter definition of success and only consider as successful those engagements where at least M3 has been achieved. In these estimations the economic significance of the risk effects increases further, by a factor between three and four, depending on the risk measure. The larger effects make sense as they capture the engagements where we know that the target started to take actions to address the investor's ESG. In Column 3 *VaR* decreases by 0.993 from before to after the engagement, relative to control firms. We find positive and significant effects also for *LPM* in Column 7.

On the other hand, Columns 4 and 8 show no evidence of significant downside risk reductions among those targets where engagement has not achieved M2. As we discuss in more detail below, these results are notable and reduce potential concerns about the results being driven by a confounding mechanism (e.g., the stock-picking ability of the investor).[16]

For robustness, in IA Table IV we re-estimate Equation (1) without control variables (in Panel A) and with alternative (firm and industry-by-month) fixed effects (in Panel B). In both panels successful engagements are associated with a decline in downside risk. In Panel C we show that results are unaffected if we use unwinsorized versions of the dependent variables.

3.3 Identification Assumptions and Threats

The key identifying assumption for our analysis is that—absent treatment—targeted firms would not have trended differentially from the matched control firms in terms of their changes in downside risk. To assess whether the parallel trends assumption holds, we perform several checks.

[16] Financials constitute the most frequently observed industry of the targeted firms (Figure 2). As this sector is highly regulated and special in nature, it would be implausible if our results mostly originate from such targets. Indeed, IA Table III shows that our results are robust to excluding Financials.

3.3.a Absence of Pre-Trends

The parallel trends assumption suggests that we should not observe differential trends in downside risk between treated and control firms prior to engagement. To evaluate this, Figure 4 displays for the targeted and control firms the evolution of the downside risk measures (average values) over the two-year period prior to the investor's engagement. While both the *VaR* measure (Panel A) and the *LPM* measure (Panel B) exhibit time-series variations with slight declines leading up to the engagement, the trends for both the targeted and control firms are similar.

Next, we employ the stacked regression framework to check for differential pre-trends as well as the timing of the risk reductions after the treatment. To do so, we replace *Target x Post* in Equation (1) with seven terms that interact *Target* with indicator variables for each half-year period before (HY-3 to HY-1) or after (HY1 to HY4) an engagement, with the half-year period HY-4 being the excluded period.

The estimates in Table V, Panel A, show that all three interaction terms for the pre-engagement period are statistically insignificant, indicating the absence of pre-treatment trends. Most of the overall downside risk reductions occur in the second and third half year after the engagement. Although statistical significance is lower compared to the baseline estimates in which we pool the post-engagement periods, the magnitudes of the point estimates remain large.

The estimated timelines are intuitive—one would expect it to take time until the investor's engagement successfully reduces stock price-based measures of risk. These results are also consistent with the time frames shown in Table II, which demonstrate time is required until the engagement reaches a milestone indicating success. We further observe that the downside risk measures in the fourth half year do not differ significantly between targeted and control firms. This indicates that some of the risk reductions are temporary, which is

consistent with the observation that the investor performs repeated engagement in some target firms.

3.3.b Covariate Imbalance

To further evaluate the parallel trends assumption, IA Table V evaluates covariate imbalance by comparing the control variables between the target and control firms, calculated over the 24-month pre-engagement period. In terms of leverage, investments, and profitability, the two sets of firms are relatively similar. However, despite matching on size, target firms tend to be larger, have lower average market-to-book ratios, and have a higher free float. A concern with these observed differences is that firms with these characteristics may have trended differentially during the post-engagement period for reasons unrelated to treatment, after controlling for industry, country and year effects. If this were the case, we would incorrectly attribute any decline in downside risk to the investor`s engagement.

We address this concern in different ways. First, according to the investor, target firm selection is motivated primarily by ESG concerns. For example, an ESG issue such as climate change leads the investor to focus on specific critical industry sectors, which implies no particular differential trend between a targeted firm and the industry-matched peer. This suggests that target selection is not based on firm characteristics that likely correlate with future differential trends in downside risk *independent* of the investor's engagement. Similarly, the investor may conduct an engagement strategy focused on firms in certain countries because of country-specific ESG concerns. Importantly, as we showed above, the risk reductions are driven by those engagement where at least M2 is achieved, that is, by engagement where the investor recorded some form of engagement success. Hence, if it were the case that targets with certain characteristics would have trended differently independent of the treatment, it is unclear why this would be the case only for successful engagements (unless the parallel trends assumption is violated among successful targets only; this cannot be excluded entirely but constitutes a high hurdle).

In addition, to account for possible differential trends in the downside risk measures based on the firm characteristics, we estimate a set of regressions in which we interact the firm characteristics, including those that vary between target and controls, with the post-engagement dummy. For the firm characteristics, we calculate average values for each firm for the period prior to engagement. The corresponding estimates are reported in Table V, Panel B. The estimates continue to show that successful engagements are associated with reductions in *VaR* and *LPM*, with magnitudes similar to those in Table IV.

3.4 Heterogeneous Effects of ESG Engagement on Downside Risk

As shown in Figure 1, the investor's engagement strategies have a broad regional reach and as shown in Table I, the 1,443 engagements also vary across environmental, social and governance subthemes. Consequently, we test whether differences exist in the engagement outcomes according to region or engagement theme.

3.4.a Downside Risk Results by Region

Due to differences in markets and institutions, the success of an engagement may depend in part on the geographic location of the firm. For example, using a global shareholder engagement sample, Becht et al. (2017) demonstrate that activists are most successful in reaching their engagement objectives for targeted firms located in North America. Moreover, they find the short-run announcement returns around the disclosure of an activist's equity stake in a target to be highest among North American firms, followed by targets in Asia and Europe, suggesting that investors expect different success rates across these regions.[17] Given this evidence for non-ESG-related engagements, we examine whether our investor's risk reduction engagement effects vary across major world regions. To do so, we re-estimate

[17] The analysis in Becht et al. (2017) does not consider ESG engagements. Note that Dimson, Karakaş, and Li (2015) are unable to explore the cross-country variation of success rates and announcement returns as their sample is restricted to targets from the United States.

Equation (1) separately for targeted and control firms in North America, Europe, and the Rest of the World.

Table VI reports the corresponding results by world region for *VaR* in Panel A and for *LPM* in Panel B. Columns 1 to 3 in both panels report results for all engagements by region (i.e., irrespective of engagement success), while Columns 4 to 6 consider engagements where at least M2 was reached. We find the effects of ESG engagement on both measures of downside risks are strongest for targeted firms in North America that reach M2, while there is virtually no effect of ESG engagement on downside risk in Europe and insignificant effects in the remaining countries. These regional differences are consistent with the Becht et al. (2017) findings for their hedge fund activist to achieve outcome success.

Based on our conversations with the investor, favorable factors contributing to the measured risk reductions in North America include comparably strong investor rights to execute the engagements, coupled with the possibility to follow up at the annual meeting and ultimately, a possible threat to conduct a proxy fight. A further factor is the relatively higher levels of transparency in the United States about many aspects of the firm and its actions, including transparency regarding additional institutional investors (e.g., based on quarterly public 13f filings) who could assist in pressuring the firm for the requested changes or who could help in a proxy fight if needed (which would be consistent with the results in Kedia, Starks, and Wang, 2021 regarding institutional investors aiding hedge fund activists).

3.4.b Downside Risk Results by Engagement Theme

In Table VII we report the results by the different ESG engagement themes, which allows us to determine whether some engagement topics have greater potential for downside risk reductions. In Panel A we report results for *VaR* and in Panel B for *LPM*, where Columns 1 to 3 provide results for all engagements (i.e., irrespective of engagement success). In Column 1 the results indicate that firms engaged for environmental issues experience a decline in downside risk. In contrast, in Columns 2 and 3, we do not find statistically significant effects

for engagements based on either the social or governance themes. Measuring success based on M2 in Columns 4 to 6, we continue to find that only engagement on environmental issues results in a statistically significant reduction in downside risk. For engagements over such topics, which as shown in Table I, Panel A, primarily have the theme of climate change, *VaR* at target firms decreases by 0.299 after the engagement, relative to control firms. In Panel B we consider *LPM* as the risk measure and find results that are similar, with a significant decline in downside risk for environmental engagements in Column 1. At the same time, the effect for environmental topics reaching M2 in Column 4 is noisier compared to Panel A and marginally insignificant.

This heterogeneity in results across engagement topics shown in Table VII has several implications. First, the weaker effects for governance topics combined with evidence from prior research suggest that engagements on compensation topics or board independence, the top subthemes within this area, most directly affect the first moments of the return distributions (see Becht et al., 2009; Brav et al., 2008; or Dimson, Karakaş, and Li, 2015) rather than firm risk.

Second, with regard to the social topics, one reason for the lack of statistical significance in downside risk reduction could be that such themes reflect more subjective concerns. This means that it is rather easy for a target to make some verbal commitment regarding a cultural change or better gender balance, but it would be much harder to then actually define tangible actions and even implement them. This explanation is also supported by the time it takes to go from one milestone to the next (Table II, Panel B): social engagements are quickest when it comes to achieving M2, but they are tied for slowest in M4 achievement. Another potential reason for the weaker risk reduction effects for social engagements might be that investors in a target firm find it difficult to observe, measure, and price improvements related to social topics (to the contrary, environmental improvements related to emission reductions or disclosure are probably easier to objectively measure).

4. Risk Reduction Channel: Empirical Results on Environmental Incidents

4.1 Empirical Methodology

One potential economic channel for our results would occur if the downside risk reductions correspond to a decline in observable ESG risk outcomes. Given that the significant risk reduction results in the previous sections originate primarily from environmental engagements, we focus on negative *environmental* risk outcomes. We measure such outcomes using news-based data on environmental risk incidents from RepRisk, a data provider that each day screens more than 100,000 public sources for greater than 200,000 firms globally in 23 languages (the languages of all target countries listed in Figure 1 are covered). The sources used to identify environmental incidents include print, online, and social media; government bodies, regulators, think tanks, and newsletters; and other online sources. Two benefits of a RepRisk-based measure are helpful in our setting: First, RepRisk provides global coverage and, second, the incidents that it identifies primarily reflect idiosyncratic events (Gantchev, Giannetti, and Li, 2022). To identify meaningful reductions in environmental risks, our variable measurement considers the severity of environmental incidents, with more severe incidents receiving higher weights.[18] (We alternatively use a measure reflecting the number of *novel* incidents for robustness.) IA Table VI reports the distribution of environmental risk incidents across the sample target firms, showing that the incident distribution is highly skewed.

To document an ESG-incident channel underlying the downside risk reductions, for

[18] RepRisk determines the severity of an incident as a function of i) the consequences of the risk incident; ii) the extent of the impact; and iii) whether the risk incident was caused by an accident, by negligence, or intent, or even in a systematic way. RepRisk then classifies such incidents using three levels of severity: low, medium, and high severity. Our measure is constructed as the sum of all severe environmental incidents, whereby we weight a severe incident with 1 if it is a low severity incident, with 2 if it is a medium severity incident, and with 3 if it is a high severity incident.

each firm *i* in month *t* that is targeted by an environmental engagement we estimate the following model:

$$\#\ E\ incidents_{i,t} = \exp(\alpha + \beta_1\, Post_{i,t} + \beta_2\, \boldsymbol{X}_{i,t-12} + Fixed\ Effects + \varepsilon_{i,t}), \quad (2)$$

where *# E incidents* is a measure of the number of environmental risk incidents for target *i* in month *t*, with the measure accounting for the severity of an incident. The mean of the variable equals 0.88 with a standard deviation of 1.55. *Post* equals 1 for all firm-month observations after target *i* has been targeted in month *t*, and 0 before, and ***X*** contains the same control variables as in Equation (1). We include industry, year and country fixed effects. To identify whether the engagement-induced changes in downside risk relate to actual changes in environmental incidents, we exploit within-target variation and estimate Equation (2) for targets with large versus small reductions in downside risk. For this purpose, we calculate average values for *VaR* and *LPM* separately over the two-year periods before and after the initial engagement, and then classify each target firm based on whether the respective change in *VaR* or *LPM* is above ("Large") or below ("Small") the median. Equation (2) is estimated using Poisson regressions, rather than "log1plus" models, to account for the distribution of *# E incidents*, the count-based outcome variable.[19] In these estimations, we do not apply the stacked regressions. The reason is that Poisson regressions allow us to include our rich set of fixed effects without biasing the estimation, but they base the estimation only on observations with at least one nonzero value for the dependent variable within a fixed effects group (Cohn, Liu, and Wardlaw, 2022). This is desirable as it restricts the usable sample to those groups that are informative about the effects of the engagement variable (Post) on *# E incidents*. The downside of this benefit is that the number of observations would decline by

[19] Poisson models provide unbiased estimates for dependent variables with a large mass of values at 0 combined with severe skewness (Cohn, Liu, and Wardlaw, 2022).

about 30% if we were to add cohort fixed effects as required in stacked regressions.[20]

4.2 Downside Risk Reductions and Environmental Incidents

Table VIII reports the regression results obtained from estimating Equation (2). In Column 1, which includes all targets independent of the realized change in downside risk, we observe a marginally significant decline in severe environmental incidents after the investor's engagement. More importantly, in Columns 2 and 4 we consider only those target firms for which we observe large declines in *VaR* or *LPM* as a result of the investor's engagement over an environmental topic. For these subsets of targets, we find a large and highly significant decrease in the number of environmental risk incidents after the engagement. Column 2 implies that the severity-weighted number of environmental incidents declines by 25% from before to after the engagement. In Columns 3 and 5, we find no statistically significant decline in severe environmental incidents among engagements where downside risks did not decrease by a large amount.

IA Table VII provides alternative specifications of Equation (2) to address different potential concerns with the analysis. Columns 1 to 4 consider the subset of targets that exhibit large declines in *VaR* and *LPM*. In Columns 1 and 2 results remain negative and significant if we control for a linear time trend, in order to address that RepRisk may have screened more incidents over time. In Columns 3 and 4 we continue to find effects if we only consider those environmental incidents classified as "novel" by RepRisk (i.e., cases where it is the first time that a firm is exposed to a specific environmental issue). This implies that the engagement process reduces the occurrence of new risks, instead of only mitigating the reoccurrence of prior risk issues. Finally, in Columns 5 and 6, we estimate Equation (2) on the full sample of

[20] When we estimate stacked regressions on this smaller sample, we find a large and significant decrease in the number of environmental risk incidents for targets with large declines in the VaR. For the LPM measure, the effect on risk incidents is also large, but it is noisier and eventually insignificant with a *t*-statistic of 1.36.

environmental targets and include interaction terms of *Post* with indicator variables reflecting a large decline in *LPM* or *VaR*, respectively. Also in these specifications, we find larger reductions in environmental incidents for targets experiencing large declines in downside risk.

5. Conclusions

We employ proprietary data from an influential activist investor to examine whether shareholder engagement regarding ESG topics can reduce downside risk. Using two measures of downside risk, value at risk and the lower partial moment, we demonstrate that ESG shareholder engagements result in risk reductions. Further evidence in support of this hypothesis comes from the fact that the risk-reduction effects are concentrated among the successful engagements. The risk reduction effects vary across ESG engagement themes, being driven primarily by the effects from environmental engagements. The prime issue within this engagement category is climate change. Finally, we provide evidence on a channel through which the engagement activities reduce downside risk. We document a large decline in the number of environmental risk incidents at targeted firms with large engagement-induced downside risk reductions. There is no corresponding decline among targets where downside risks did not decrease by a large amount. Given the increasing engagement by institutional investors on ESG issues, our analysis contributes new insights into understanding the channel through which ESG engagement can create value for investors beyond affecting returns.

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Appendix A: Variable definitions

Variable	Definition	Data Source
Engagement Target	Dummy variable that equals 1 for firm-month observations if a firm is an engagement target, and 0 if it is a control firm. Control firms are matched with engagement targets using country, industry, and size as matching criteria. Control firms are never targeted during the sample period.	Self-constructed
Post	Dummy variable that equals 1 for firm-month observations after an engagement, and 0 for firm-month observations before an engagement.	Self-constructed
Pre HY-1	Dummy variable that equals 1 for firm-month observations in the first half year before an engagement, and 0 for other firm-month observations. *Pre HY-2* to *Pre HY-3* are defined accordingly, but for the second and third half year before an engagement.	
Post HY1	Dummy variable that equals 1 for firm-month observations in the first half year after an engagement, and 0 for other firm-month observations. *Post HY2* to *Post HY4* are defined accordingly, but for the second, third, and fourth half year after an engagement.	Self-constructed
VaR	Variable that measures the value at risk, calculated at the firm-month level from daily log stock returns. We measure the VaR by taking daily return outcomes ranked at the bottom fifth percentile (5%-VaR). This essentially corresponds to the worst daily return during a month. We take the absolute values of the VaR. Winsorized at 1%/99%.	Datastream
LPM	Variable that measures the lower partial moment of the second order, calculated at the firm-month level from daily log stock returns. It is defined as: $$LPM\ (0,2) = \sqrt{\frac{1}{N_1 - 1}\sum_{i=1}^{N_1}(r_{n,i} - \overline{r_{n,i}})^2}$$ where $r_{n,i}$ indicates a negative daily return of firm i during a given month, and $\overline{r_{n,i}}$ is the mean value of $r_{n,i}$. N_1 is the number of observed negative daily returns for firm *i* during a given month. Winsorized at 1%/99%.	Datastream
Market value	Market value of equity, calculated at the firm-month level. Winsorized at 1%/99%.	
Market-to-book ratio	Market value of equity divided by book value of equity. Market value of equity is calculated at the firm-month level, book value of equity is calculated at the firm-year level. Winsorized at 1%/99%.	Datastream
Leverage (in %)	Total debt divided by common equity, calculated at the firm-year level. Total debt is the sum of long-term and short-term debt. Winsorized at 1%/99%.	Datastream
Investment (in %)	Capital expenditures over assets, calculated at the firm-year level. Winsorized at 1%/99%.	Datastream

Profit margin (in %)	Operating income over total sales, calculated at the firm-year level. Winsorized at 1%/99%.	Datastream
Freefloat (in %)	Number of shares available as free float, divided by number of shares issued, calculated at the firm-year level. Winsorized at 1%/99%.	Datastream
# E incidents	Measure of the number of environmental risk incidents in a firm-month. In the construction of the measure, more severe incidents receive higher weights. RepRisk determines the severity of an incident as a function of three dimensions: i) what are the consequences of the risk incident?; ii) what is the extent of the impact?; and iii) was the risk incident caused by an accident, by negligence, or intent, or even in a systematic way? RepRisk then classifies such incidents using three levels of severity: low, medium, and high severity. Our measure is constructed as the sum of all severe incidents, whereby we weight a severe incident with 1 if it is a low severity incident, with 2 if it is a medium severity incident, and with 3 if it is a high severity incident. RepRisk identifies environmental risks incidents related to the following topics: Animal mistreatment; climate change, GHG emissions, and global pollution; impacts on landscapes; ecosystems, and biodiversity; local pollution; overuse and wasting of resources; and waste issues.	RepRisk
# Novel E incidents	Measure of the number of novel environmental risk incidents in a firm-month. In the construction of the measure, more novel incidents receive higher weights. RepRisk determines the novelty (newness) of an incident based on whether it is the first time a firm is exposed to a specific environmental. RepRisk then classifies such incidents using two levels to measure the magnitude of novelty: 1 or 2. Our measure is constructed as the sum of all novel incidents, whereby we weight each incident with a 1 or 2 depending on the novelty (larger number indicate more novel incidents).	

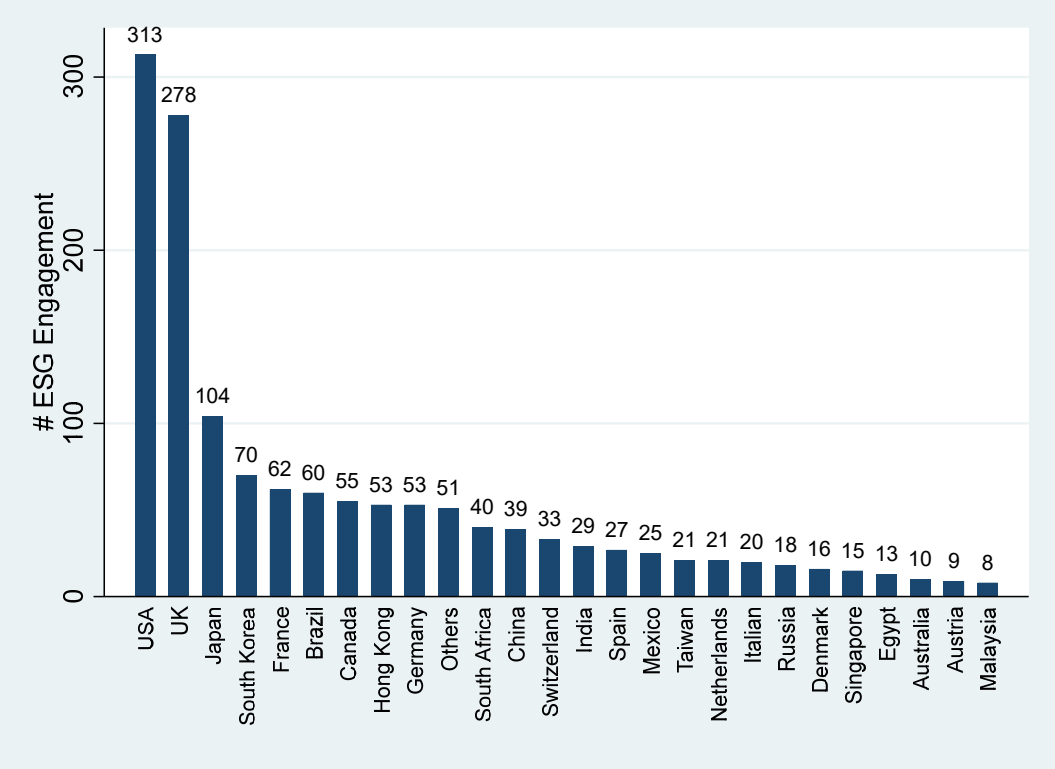

Figure 1. ESG engagements by country.

This figure reports engagements by the target firm's country of incorporation. The sample consists of 1,443 engagements across 485 targeted firms over the period January 2005 through April 2018.

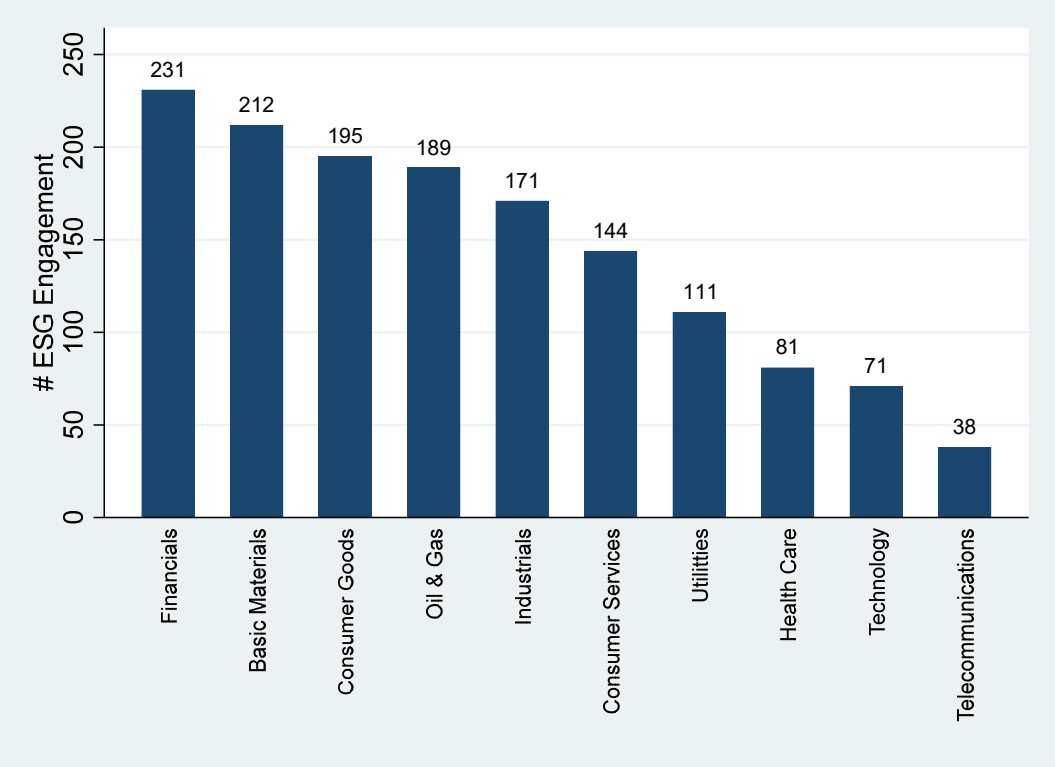

Figure 2. ESG engagements by industry.

This figure reports engagements by the target firm's industry. The sample consists of 1,443 engagements across 485 targeted firms over the period January 2005 through April 2018. Industries are classified based on one-digit FTSE Russell Industry Classification Benchmark (ICB) codes.

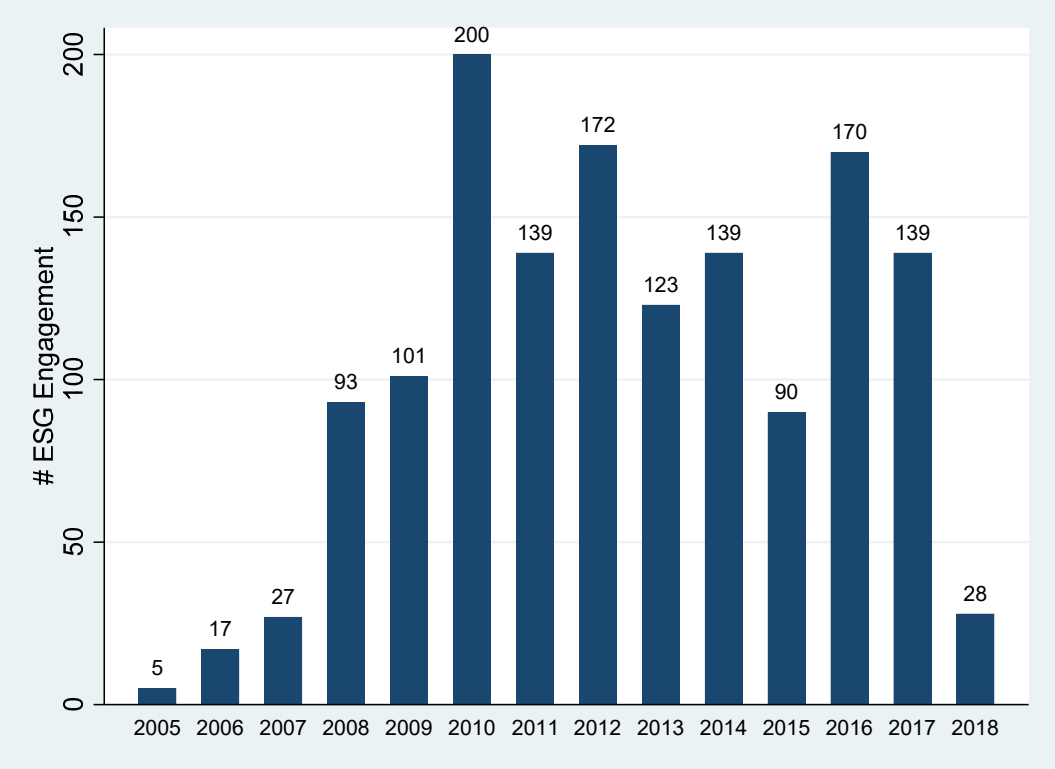

Figure 3. Total ESG engagements by year.

This figure reports engagements by year of the initial engagement. The sample consists of 1,443 engagements across 485 targeted firms over the period January 2005 through April 2018. The 2018 year is partial year; thus, the 2017 year is the last year with complete engagement data in our sample.

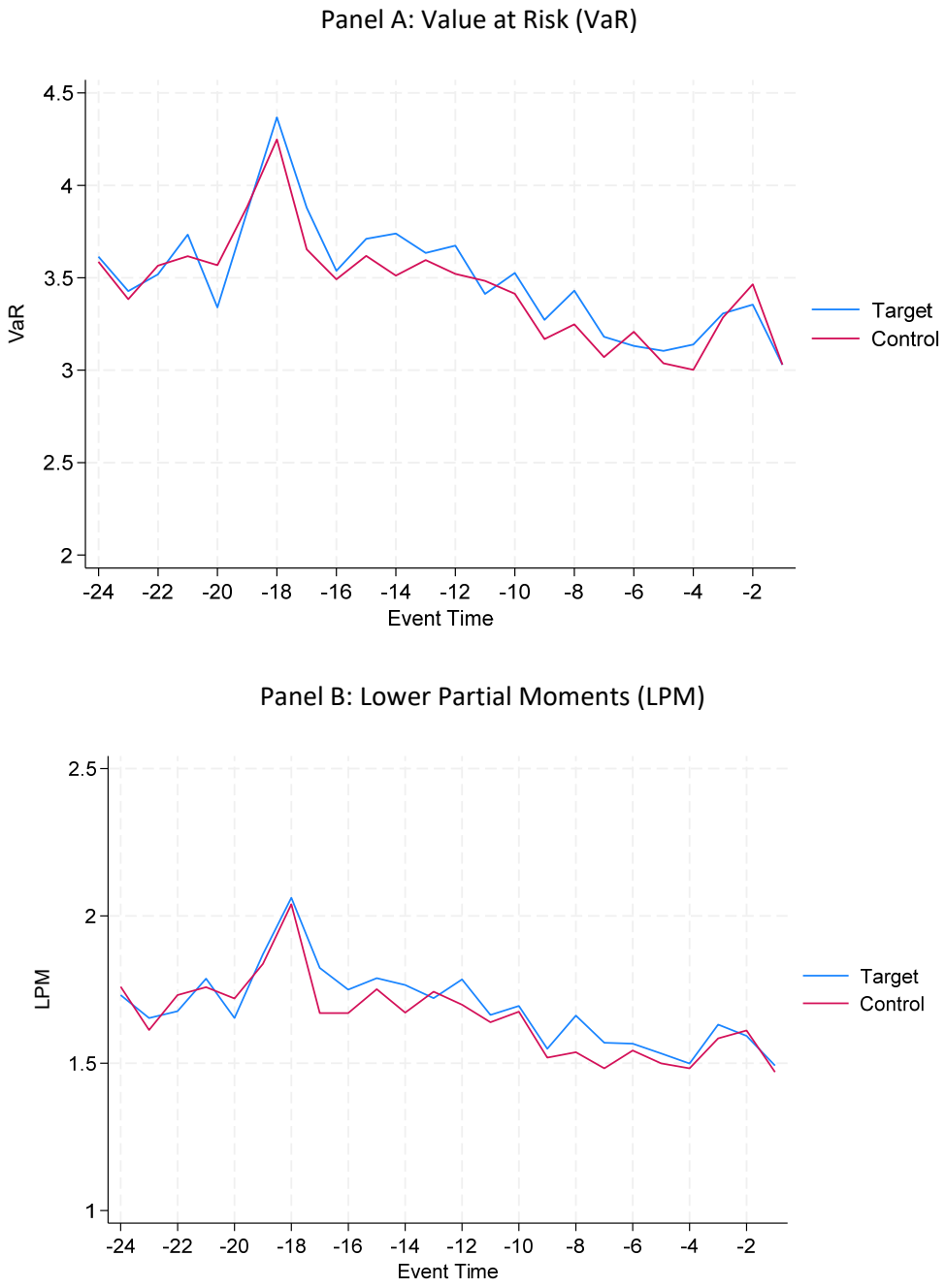

Figure 4. Evidence of parallel trends.

This figure reports the time-series evolution of the downside risk measures, *VaR* in Panel A and *LPM* in Panel B, over the 24-month period prior to initial engagement. The figure compares target and control firms. The sample in this analysis includes 279 targeted firms and 279 matched control firms, where control firms are matched with engagement targets using country, industry, and size as matching criteria. Variable definitions are provided in Appendix A.

Table I. Summary statistics on engagement themes

This table provides summary statistics across three engagement themes: environmental; social; and governance. The table also breaks down these themes into subthemes, and reports the number (percentage) of engagements within each engagement theme. The sample consists of 1,443 engagements across 485 targeted firms over the period January 2005 through April 2018.

Panel A: Environmental engagements		
Sub-themes	#	%
Climate change	179	47
Environmental policy and strategy	51	13
Supply chain management	44	12
Water	40	11
Pollution and waste management	38	10
Forestry and land use	27	7
Total	379	100
% of engagements (N = 1,443)	26.3	
Panel B: Social engagements		
Sub-themes	#	%
Human rights	142	42
Labour rights	91	27
Bribery and corruption	47	14
Conduct and culture	39	12
Other social	16	5
Total	335	100
% of engagements (N = 1,443)	23.2	
Panel C: Governance engagements		
Sub-themes	#	%
Executive remuneration	206	28
Board independence	193	26
Board diversity skills and experience	165	23
Succession planning	84	12
Shareholder protections and rights	81	11
Total	729	100
% of engagements (N = 1,443)	50.5	

Table II. Summary statistics on engagement success and duration

This table displays descriptive statistics on measures of engagement success ("milestones") (in Panel A) and on engagement durations (in months) (in Panel B), reported by milestone (M) and engagement theme. In Panel A, the success percentages are relative to all engagements as well as relative to all engagements of a given theme (E, S, or G). As the average engagement duration equals 35 months and our data end in early 2018, some engagements are still work-in-progress or pending by the end of the sample period, implying that M3 or M4 may not yet have been achieved. The sample consists of 1,443 engagements across 485 targeted firms over the period January 2005 through April 2018.

	Panel A: Engagement success		**Panel B: Engagement duration (months)**		
	#	% E, S, G, or all Engagements	Mean	STD	Max
M1: Concern raised with target					
E engagements	77	20	2	6	43
S engagements	55	16	3	8	57
G engagements	130	18	2	4	24
All engagements	262	18	2	6	57
M2: Issue acknowledged by target					
E engagements	152	40	4	9	62
S engagements	95	28	3	6	31
G engagements	186	26	9	17	109
All engagements	433	30	6	13	109
M3: Actions taken by target					
E engagements	67	18	19	16	65
S engagements	84	25	24	24	101
G engagements	126	17	27	22	98
All engagements	277	19	24	21	101
M4: Engagement successfully completed					
E engagements	83	22	35	27	108
S engagements	101	30	41	26	118
G engagements	287	39	32	25	119
All engagements	471	33	35	25	119
Total engagements	1,443				

Table III. Summary statistics

This table reports summary statistics at the firm-month level of the variables used in the stacked regressions. The sample in this analysis includes 279 targeted firms and 279 matched control firms. Variable definitions are provided in Appendix A.

Variable	Mean	STD	25%	Median	75%	Obs.
VaR	3.28	2.24	1.80	2.71	4.08	26,082
LPM	1.58	1.06	0.88	1.30	1.95	26,082
Target	0.50					26,082
Post	0.50					26,082
Log(Market value)	9.07	1.32	8.16	9.01	9.99	26,082
Market-to-book ratio	2.98	3.05	1.24	1.94	3.34	26,082
Leverage (in %)	34.09	21.08	19.17	32.37	47.88	26,082
Investment (in %)	11.17	15.86	2.84	5.57	12.63	26,082
Profit margin (in %)	15.60	13.27	6.37	12.60	20.71	26,082
Freefloat (in %)	71.89	25.87	50.00	80.00	94.00	26,082

Table IV. Effects of ESG engagement on downside risk: Baseline results

This table reports stacked regressions at the firm-month level to estimate the effects of ESG engagement on downside risk. For each treatment event, we create an event-specific "cohort" dataset, whereby a cohort is defined by the firms (first) engaged in a given month (plus the corresponding matched firms). These datasets are then "stacked" together and a DiD regression is estimated using the stacked dataset, with cohort-specific fixed effects being added to the fixed effects structure. Regressions are estimated for the two-sided 24-month window around the month in which a target is engaged. The dependent variable is measured as *VaR* or *LPM*. *VaR* is the 5% value at risk using absolute values such that smaller numbers reflect less downside risk. *LPM* is the lower partial moment of the second order of the return distribution. Both measures are calculated at the firm-month level from daily return data. *Target* equals 1 for firm-month observations if a firm is an engagement target, and 0 if it is a control firm. *Post* equals 1 for all firm-month observations after the initial engagement, and 0 before. Engagement success is measured based on whether certain milestones have been achieved. In the case of multiple engagements at a target, an average success rate (in terms of milestones achieved) is calculated across all engagements at the firm. The sample in this analysis includes 279 targeted firms and 279 matched control firms, where control firms are matched with engagement targets using country, industry, and size as matching criteria. Variable definitions are provided in Appendix A. *t*-statistics, calculated based on robust standard errors clustered by firm, are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

Dependent variable:	*VaR*				*LPM*			
Engagement success:	All	M2 and above	M3 and above	Below M2	All	M2 and above	M3 and above	Below M2
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Target x Post	-0.081*	-0.205**	-0.993***	-0.000	-0.046**	-0.087**	-0.454***	-0.018
	(-1.67)	(-2.45)	(-3.11)	(-0.01)	(-2.02)	(-2.17)	(-2.92)	(-0.75)
Log(Market value)	-0.893***	-1.012***	-2.548***	-1.020***	-0.439***	-0.511***	-1.206***	-0.489***
	(-17.64)	(-10.91)	(-7.36)	(-13.45)	(-17.57)	(-11.12)	(-7.64)	(-13.41)
Market-to-book ratio	-0.070***	-0.093***	-0.090	-0.065***	-0.034***	-0.046***	-0.043*	-0.029***
	(-6.28)	(-5.15)	(-1.62)	(-4.63)	(-6.24)	(-5.40)	(-1.74)	(-4.50)
Leverage	0.005***	0.002	0.002	0.006***	0.003***	0.001	0.002	0.003***
	(2.66)	(0.59)	(0.12)	(3.05)	(2.69)	(0.35)	(0.22)	(2.66)
Investment	0.000	-0.000	0.055**	0.002	-0.000	-0.000	0.028**	0.001
	(0.10)	(-0.04)	(2.13)	(0.90)	(-0.13)	(-0.05)	(2.28)	(0.49)
Profit margin	0.012***	0.007	0.024	0.021***	0.006***	0.003	0.005	0.009***
	(3.36)	(1.02)	(0.75)	(5.56)	(3.07)	(0.85)	(0.32)	(5.06)
Freefloat	0.002	-0.002	-0.006	0.004***	0.002**	-0.000	-0.004	0.002***
	(1.41)	(-0.40)	(-0.58)	(2.82)	(2.03)	(-0.12)	(-0.74)	(3.23)
Model	Stacked	Stacked	Stacked	Stacked	Stacked	Stacked	Stacked	Stacked
Country x Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry x Year x Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Target x Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Post x Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	26,081	10,263	1,852	15,818	26,081	10,263	1,852	15,818
Adj. R-sq.	0.426	0.457	0.530	0.420	0.454	0.482	0.539	0.456

Table V. Effects of ESG engagement on downside risk: Pre-treatment differences and dynamic treatment effects

This table reports stacked regressions at the firm-month level to estimate the effects of ESG engagement on downside risk. Regressions are estimated for the two-sided 24-month window around the month in which a target is engaged. The dependent variable is measured as *VaR* or *LPM*. *VaR* is the 5% value at risk using absolute values such that smaller numbers reflect less downside risk. *LPM* is the lower partial moment of the second order of the return distribution. Both measures are calculated at the firm-month level from daily return data. *Target* equals 1 for firm-month observations if a firm is an engagement target, and 0 if it is a control firm. *Post* equals 1 for firm-month observations after the initial engagement, and 0 before. *Pre HY-1* (Post HY1) equals 1 for all firm-month observations in the first half year before (after) an engagement, and 0 for all other firm-month observations. *Pre HY-2* to *HY-3* (*Post HY1* to *HY4*) are defined accordingly, but for the second, third (and fourth) half year before (after) an engagement. Engagement success is measured based on whether certain milestones have been achieved. In the case of multiple engagements at a target, an average success rate (in terms of milestones achieved) is calculated across all engagements at the firm. The sample in this analysis includes 279 targeted firms and 279 matched control firms, where control firms are matched with engagement targets using country, industry, and size as matching criteria. Variable definitions are provided in Appendix A. *t*-statistics, calculated based on robust standard errors clustered by firm, are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

	Panel A: Dynamic treatment effects		**Panel B: Pre-treatment differences**	
Dependent variable:	*VaR*	*LPM*	*VaR*	*LPM*
	Dynamic Treatment Effects			
Engagement success:	M2 and above	M2 and above	M2 and above	M2 and above
	(1)	(2)	(3)	(4)
Target x Post			-0.215***	-0.097**
			(-2.60)	(-2.59)
Target x Pre HY-3	0.014	-0.021		
	(0.06)	(-0.21)		
Target x Pre HY-2	0.109	0.041		
	(0.61)	(0.52)		
Target x Pre HY-1	-0.031	-0.049		
	(-0.21)	(-0.75)		
Target x Post HY1	-0.047	-0.025		
	(-0.29)	(-0.34)		
Target x Post HY2	-0.266*	-0.157**		
	(-1.75)	(-2.19)		
Target x Post HY3	-0.288*	-0.146*		
	(-1.84)	(-1.94)		
Target x Post HY4	-0.117	-0.049		
	(-0.62)	(-0.54)		
Controls	Yes	Yes	No	No
Pre-treatment controls	No	No	Yes	Yes
Pre-treatment controls x *Post*	No	No	Yes	Yes
Pre HY-3 to *Pre HY-1* dummies	Yes	Yes	No	No
Post HY1 to *Post HY4* dummies	Yes	Yes	No	No
Model	Stacked	Stacked	Stacked	Stacked
Country x Cohort fixed effects	Yes	Yes	Yes	Yes
Industry x Year x Cohort fixed effects	Yes	Yes	Yes	Yes
Target x Cohort fixed effects	Yes	Yes	Yes	Yes
Post x Cohort fixed effects	Yes	Yes	Yes	Yes
Obs.	10,263	10,263	10,263	10,263
Adj. R-sq.	0.465	0.488	0.407	0.427

Table VI. Effects of ESG engagement on downside risk: World regions

This table reports stacked regressions at the firm-month level to estimate the effects of ESG engagement on downside risk for targeted firms. Results are reported by world region (North America, Europe, and Rest of World). Panel A reports results for *VaR* and Panel B for *LPM*. Regressions are estimated for the two-sided 24-month window around the month in which a target is engaged. The dependent variable is measured as *VaR* or *LPM*. *VaR* is the 5% value at risk using absolute values such that smaller numbers reflect less downside risk. *LPM* is the lower partial moment of the second order of the return distribution. Both measures are calculated at the firm-month level from daily return data. *Target* equals 1 for firm-month observations if a firm is an engagement target, and 0 if it is a control firm. *Post* equals 1 for firm-month observations after the initial engagement, and 0 before. Engagement success is measured based on whether certain milestones have been achieved. In the case of multiple engagements at a target, an average success rate (in terms of milestones achieved) is calculated across all engagements at the firm. The sample in this analysis includes 279 targeted firms and 279 matched control firms, where control firms are matched with engagement targets using country, industry, and size as matching criteria. Variable definitions are provided in Appendix A. *t*-statistics, calculated based on robust standard errors clustered by firm, are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

Panel A: Effects of ESG engagement on *VaR* by region and success rate						
Dependent variable:	*VaR*			*VaR*		
Engagement success:	All			M2 and above		
Engagement region:	North America	Europe	Rest of World	North America	Europe	Rest of World
	(1)	(2)	(3)	(4)	(5)	(6)
Target x Post	-0.168**	0.001	-0.095	-0.290**	0.100	-0.246
	(-2.41)	(0.01)	(-1.15)	(-2.49)	(0.66)	(-1.56)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Model	Stacked	Stacked	Stacked	Stacked	Stacked	Stacked
Country x Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry x Year x Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Target x Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Post x Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	7,032	7,016	12,033	3,608	2,731	3,924
Adj. R-sq.	0.565	0.480	0.346	0.575	0.547	0.331
Panel B: Effects of ESG engagement on *LPM* by region and success rate						
Dependent variable:	*LPM*			*LPM*		
Engagement success:	All			M2 and above		
Engagement region:	North America	Europe	Rest of World	North America	Europe	Rest of World
	(1)	(2)	(3)	(4)	(5)	(6)
Target x Post	-0.090**	0.000	-0.052	-0.129**	0.053	-0.098
	(-2.59)	(0.01)	(-1.35)	(-2.20)	(0.69)	(-1.32)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Model	Stacked	Stacked	Stacked	Stacked	Stacked	Stacked
Country x Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry x Year x Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Target x Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Post x Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	7,032	7,016	12,033	3,608	2,731	3,924
Adj. R-sq.	0.566	0.502	0.393	0.577	0.572	0.371

Table VII. Effects of ESG engagement on downside risk: Engagement themes

This table reports stacked regressions at the firm-month level to estimate the effects of ESG engagement on downside risk. Results are reported based on the initial engagement theme. Panel A reports results for *VaR* and Panel B for *LPM*. Regressions are estimated for the two-sided 24-month window around the month in which a target is engaged. The dependent variable is measured as *VaR* or *LPM*. *VaR* is the 5% value at risk using absolute values such that smaller numbers reflect less downside risk. *LPM* is the lower partial moment of the second order of the return distribution. Both measures are calculated at the firm-month level from daily return data. *Target* equals 1 for firm-month observations if a firm is an engagement target, and 0 if it is a control firm. *Post* equals 1 for firm-month observations after the initial engagement, and 0 before. Engagement success is measured based on whether certain milestones have been achieved. In the case of multiple engagements at a target, an average success rate (in terms of milestones achieved) is calculated across all engagements at the firm. The sample in this analysis includes 279 targeted firms and 279 matched control firms, where control firms are matched with engagement targets using country, industry, and size as matching criteria. Variable definitions are provided in Appendix A. *t*-statistics, calculated based on robust standard errors clustered by firm, are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

Panel A: Effects of ESG engagement on *VaR* by engagement theme and success rate						
Dependent variable:	*VaR*			*VaR*		
Engagement success:	All			M2 and above		
Engagement topic:	E	S	G	E	S	G
	(1)	(2)	(3)	(4)	(5)	(6)
Target x Post	-0.285***	0.142	0.007	-0.299**	-0.204	-0.038
	(-3.49)	(1.52)	(0.10)	(-2.16)	(-1.22)	(-0.22)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Model	Stacked	Stacked	Stacked	Stacked	Stacked	Stacked
Country x Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry x Year x Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Target x Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Post x Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	9,308	5,744	11,029	4,424	2,177	3,662
Adj. R-sq.	0.447	0.386	0.455	0.424	0.432	0.574
Panel B: Effects of ESG engagement on *LPM* by engagement theme and success rate						
Dependent variable:	*LPM*			*LPM*		
Engagement success:	All			M2 and above		
Engagement topic:	E	S	G	E	S	G
	(1)	(2)	(3)	(4)	(5)	(6)
Target x Post	-0.137***	0.037	0.004	-0.106	-0.115	-0.013
	(-3.40)	(1.03)	(0.12)	(-1.52)	(-1.64)	(-0.15)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Model	Stacked	Stacked	Stacked	Stacked	Stacked	Stacked
Country x Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry x Year x Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Target x Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Post x Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	9,308	5,744	11,029	4,424	2,177	3,662
Adj. R-sq.	0.467	0.422	0.489	0.441	0.473	0.597

Table VIII. Effects of environmental engagement on subsequent environmental incidents

This table reports Poisson regressions at the firm-month level to estimate the effects of environmental engagement on subsequent environmental incidents. Regressions are estimated for the two-sided 24-month window around the month in which a target is engaged. We separate the sample based on whether the decrease in downside risk, measured using *VaR* or *LPM*, from before to after an environmental engagement is above (Large) or below (Small) the median. The dependent variable is measured as *# E incidents*, which is a measure of the number of environmental risk incidents in a firm-month, where more severe incidents receive higher weights. *Post* equals 1 for firm-month observations after the initial engagement, and 0 before. The sample in this analysis includes 99 targeted firms with environmental engagements. Variable definitions are provided in Appendix A. *t*-statistics, calculated based on robust standard errors clustered by firm, are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

Dependent variable:	*# E incidents*				
Downside risk measure:		*VaR*		*LPM*	
Δ Downside $Risk_{Pre\ vs\ Post}$:	All	Large	Small	Large	Small
	(1)	(2)	(3)	(4)	(5)
Post	-0.204*	-0.359***	0.152	-0.356***	-0.011
	(-1.71)	(-2.95)	(1.00)	(-3.00)	(-0.08)
Log(Market value)	0.466***	0.588***	0.240**	0.433***	0.208**
	(5.44)	(4.32)	(2.13)	(4.18)	(1.99)
Market-to-book ratio	-0.065	-0.178*	-0.021	-0.078	-0.151**
	(-1.33)	(-1.93)	(-0.28)	(-1.22)	(-2.52)
Leverage	0.004	0.016	-0.012*	0.008	-0.005
	(0.59)	(1.54)	(-1.67)	(1.04)	(-0.84)
Investment	-0.006	-0.011	-0.014	-0.010	-0.027**
	(-0.84)	(-1.15)	(-1.14)	(-1.26)	(-2.34)
Profit margin	-0.017**	-0.023***	0.024	-0.025***	0.055***
	(-2.49)	(-2.71)	(1.38)	(-3.33)	(3.99)
Freefloat	0.008**	0.011***	0.003	0.014***	-0.017**
	(2.11)	(3.97)	(0.27)	(4.66)	(-1.97)
Model	Poisson	Poisson	Poisson	Poisson	Poisson
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Industry x Year fixed effects	Yes	Yes	Yes	Yes	Yes
Obs.	4,439	2,222	2,217	2,272	2,167
Ps. R-sq.	0.311	0.430	0.278	0.407	0.314

Internet Appendix

for

ESG Shareholder Engagement and Downside Risk

IA Table I. Summary statistics on climate change engagement themes

This table provides summary statistics across 179 climate change engagements. The table also breaks down general climate change themes into subthemes, and the table reports the number (percentage) of engagements within each engagement subtheme. The sample consists of engagements over the period January 2005 through April 2018.

Climate change subtopics	#	%
Carbon strategy & risk management	51	28
Carbon disclosure/reporting	48	27
Carbon intensity reduction	45	25
Stranded assets	10	6
Others (methane, gas flaring)	25	14
Total	179	100

IA Table II. Summary statistics of engagement actions and targeted individuals

This table reports summary statistics on different engagement actions (Panel A) as well as the positions of the individuals that were targeted by the investor (Panel B). The statistics are reported by engagement themes and milestones achieved (in total and, in italics, per engagement). The sample consists of 1,443 engagements across 485 targeted firms over the period January 2005 through April 2018.

	Engagement themes				Engagement progress by milestones				
	E	S	G	Total	M1	M2	M3	M4	Total
Panel A: Action types									
Meeting	1,073	1,083	2,049	4,205	457	588	856	2,304	4,205
	2.8	*3.2*	*2.8*	*2.9*	*1.7*	*1.4*	*3.1*	*4.9*	*2.9*
Email	413	479	838	1,730	161	283	380	906	1,730
	1.1	*1.4*	*1.1*	*1.2*	*0.6*	*0.7*	*1.4*	*1.9*	*1.2*
Conference call	340	399	737	1,476	166	237	309	764	1,476
	0.9	*1.2*	*1.0*	*1.0*	*0.6*	*0.5*	*1.1*	*1.6*	*1.0*
Letter	304	295	674	1,273	136	218	282	637	1,273
	0.8	*0.9*	*0.9*	*0.9*	*0.5*	*0.5*	*1.0*	*1.4*	*0.9*
Others	226	174	285	685	94	157	222	356	829
	0.6	*0.5*	*0.4*	*0.5*	*0.4*	*0.4*	*0.8*	*0.8*	*0.6*
Panel B: Targeted individuals									
Chairman	217	267	796	1,280	128	179	204	769	1,280
	0.6	*0.8*	*1.1*	*0.9*	*0.5*	*0.4*	*0.7*	*1.6*	*0.9*
Committee member	167	150	582	899	76	104	204	515	899
	0.4	*0.4*	*0.8*	*0.6*	*0.3*	*0.2*	*0.7*	*1.1*	*0.6*
Board of directors	72	90	231	393	36	50	64	243	393
	0.2	*0.3*	*0.3*	*0.3*	*0.1*	*0.1*	*0.2*	*0.5*	*0.3*
Senior executives	361	521	775	1,657	175	237	301	944	1,657
	1.0	*1.6*	*1.1*	*1.1*	*0.7*	*0.5*	*1.1*	*2.0*	*1.1*
Shareholders	34	29	117	180	7	15	41	117	180
	0.1	*0.1*	*0.2*	*0.1*	*0.03*	*0.03*	*0.1*	*0.2*	*0.1*
Middle management	358	400	485	1,243	149	205	222	667	1,243
	0.9	*1.2*	*0.7*	*0.9*	*0.6*	*0.5*	*0.8*	*1.4*	*0.9*
CSR	472	459	586	1,517	178	232	305	802	1,517
	1.2	*1.4*	*0.8*	*1.1*	*0.7*	*0.5*	*1.1*	*1.7*	*1.1*
Investor relations and legal	98	123	256	477	68	79	88	242	477
	0.3	*0.4*	*0.4*	*0.3*	*0.3*	*0.2*	*0.3*	*0.5*	*0.3*
Secretary	90	96	336	522	64	63	104	291	522
	0.2	*0.3*	*0.5*	*0.4*	*0.2*	*0.1*	*0.4*	*0.6*	*0.4*
Others	69	106	136	311	32	45	62	172	311
	0.2	*0.3*	*0.2*	*0.2*	*0.1*	*0.1*	*0.2*	*0.4*	*0.2*

IA Table III. Effects of ESG engagement on downside risk: Excluding financial firms

This table reports stacked regressions at the firm-month level to estimate the effects of ESG engagement on downside risk after excluding financial firms (FTSE Russell ICB codes starting with 8). Regressions are estimated for the two-sided 24-month window around the month in which a target is engaged. The dependent variable is measured as *VaR* or *LPM*. *VaR* is the 5% value at risk using absolute values such that smaller numbers reflect less downside risk. *LPM* is the lower partial moment of the second order of the return distribution. Both measures are calculated at the firm-month level from daily return data. *Target* equals 1 for firm-month observations if a firm is an engagement target, and 0 if it is a control firm. *Post* equals 1 for firm-month observations after the initial engagement, and 0 before. Engagement success is measured based on whether certain milestones have been achieved. In the case of multiple engagements at a target, an average success rate (in terms of milestones achieved) is calculated across all engagements at the firm. The sample in this analysis includes 255 targeted firms and 255 matched control firms, where control firms are matched with engagement targets using country, industry, and size as matching criteria. Variable definitions are provided in Appendix A. *t*-statistics, calculated based on robust standard errors clustered by firm, are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

Dependent variable:	*VaR*				*LPM*			
Engagement success:	All	M2 and above	M3 and above	Below M2	All	M2 and above	M3 and above	Below M2
	(1)	(2)		(3)	(4)	(5)		(6)
Target x Post	-0.078	-0.262***	-1.152***	0.026	-0.044*	-0.113**	-0.521***	-0.006
	(-1.51)	(-2.76)	(-3.20)	(0.49)	(-1.83)	(-2.48)	(-2.95)	(-0.23)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Model	Stacked	Stacked	Stacked	Stacked	Stacked	Stacked	Stacked	Stacked
Country x Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry x Year x Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Target x Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Post x Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	23,818	9,213	1,660	14,605	23,818	9,213	1,660	14,605
Adj. R-sq.	0.423	0.456	0.520	0.412	0.452	0.482	0.525	0.451

IA Table IV. Effects of ESG engagement on downside risk: Robustness checks

This table reports stacked regressions to estimate the effects of ESG engagement on downside risk. In Panel A, the regressions do not include control variables, in Panel B, they include a variation in the fixed-effects structure compared to the baseline, and in Panel C they use unwinsorized measures of the dependent variables. The dependent variable is measured as *VaR* or *LPM*. *VaR* is the 5% value at risk using absolute values such that smaller numbers reflect less downside risk. *LPM* is the lower partial moment of the second order of the return distribution. Both measures are calculated at the firm-month level from daily return data. *Target* equals 1 for firm-month observations if a firm is an engagement target, and 0 if it is a control firm. *Post* equals 1 for firm-month observations after the initial engagement, and 0 before. Engagement success is measured based on whether certain milestones have been achieved. In the case of multiple engagements at a target, an average success rate (in terms of milestones achieved) is calculated across all engagements at the firm. The sample in this analysis includes 279 targeted firms and 279 matched control firms, where control firms are matched with engagement targets using country, industry, and size as matching criteria. Variable definitions are provided in Appendix A. *t*-statistics, calculated based on robust standard errors clustered by firm, are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

Panel A. No control variables								
Dependent variable:	*VaR*				*LPM*			
Engagement success:	All	M2 and above	M3 and above	Below M2	All	M2 and above	M3 and above	Below M2
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Target x Post	-0.029	-0.153**	-0.600***	0.068	-0.020	-0.061*	-0.280***	0.015
	(-0.63)	(-2.14)	(-3.26)	(1.39)	(-0.95)	(-1.80)	(-3.17)	(0.67)
Controls	No	No	No	No	No	No	No	No
Model	Stacked	Stacked	Stacked	Stacked	Stacked	Stacked	Stacked	Stacked
Country x Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry x Year x Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Target x Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Post x Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	26,081	10,263	1,852	15,818	26,081	10,263	1,852	15,818
Adj. R-sq.	0.378	0.401	0.442	0.376	0.401	0.419	0.454	0.411
Panel B. Alternative fixed effects								
Dependent variable:	*VaR*				*LPM*			
Engagement success:	All	M2 and above	M3 and above	Below M2	All	M2 and above	M3 and above	Below M2
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Target x Post	-0.065	-0.182**	-0.545**	0.010	-0.038	-0.074*	-0.252**	-0.013
	(-1.18)	(-2.04)	(-2.29)	(0.17)	(-1.43)	(-1.71)	(-2.25)	(-0.47)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Model	Stacked	Stacked	Stacked	Stacked	Stacked	Stacked	Stacked	Stacked
Firm x Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry x Month x Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	25,750	10,098	1,788	15,633	25,750	10,098	1,788	15,633
Adj. R-sq.	0.672	0.716	0.710	0.650	0.714	0.744	0.719	0.706
Panel C. Nonwinsorized downside risk measures								
Dependent variable:	*VaR*				*LPM*			
Engagement success:	All	M2 and above	M3 and above	Below M2	All	M2 and above	M3 and above	Below M2
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Target x Post	-0.104*	-0.248***	-1.248***	-0.008	-0.058**	-0.115**	-0.616***	-0.020
	(-1.95)	(-2.64)	(-3.09)	(-0.14)	(-2.32)	(-2.43)	(-2.95)	(-0.76)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Model	Stacked	Stacked	Stacked	Stacked	Stacked	Stacked	Stacked	Stacked
Country x Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry x Year x Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Target x Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Post x Cohort fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	26,081	10,263	1,852	15,818	26,081	10,263	1,852	15,818
Adj. R-sq.	0.366	0.433	0.498	0.345	0.404	0.460	0.506	0.395

IA Table V. Pre-treatment observables: Balance of covariates

This table reports summary statistics at the firm-month level of the variables used in the difference-in-differences regressions over the 24-month period prior to engagement. We report statistics separately for targeted firms and matched control firms. The sample includes 279 targeted firms and 279 matched control firms. Variable definitions are provided in Appendix A.

	Target			Control		
Variable	Mean	STD	Median	Mean	STD	Median
Log(Market value)	9.38	1.36	9.41	8.68	1.20	8.70
Market-to-book ratio	2.85	2.48	2.12	3.10	3.23	1.86
Leverage (in %)	34.39	21.01	32.74	32.87	21.13	31.29
Investment (in %)	11.41	15.93	6.14	10.81	15.26	5.46
Profit margin	16.31	13.61	12.48	15.92	13.45	13.47
Freefloat (in %)	75.53	24.60	86.00	69.60	26.72	76.00

IA Table VI. Summary statistics for environmental incidents

This table reports at the firm-month level a measure of the number of environmental risk incidents *(# Environmental incidents*). In the construction of the measure, more severe incidents receive higher weights. The sample in this analysis includes 279 targeted firms. Variable definitions are provided in Appendix A.

# E incidents	Obs.	%
0	7,944	64.3
1	1,960	15.9
2	1,511	12.2
3	410	3.3
4	189	1.5
5	96	0.8
6	97	0.8
7	32	0.3
8	24	0.2
9	26	0.2
10	11	0.1
>10	54	0.4

IA Table VII. Effects of environmental engagement on subsequent environmental incidents: Robustness

This table reports Poisson regressions at the firm-month level to estimate the effects of environmental engagement on subsequent environmental incidents. Regressions are estimated for the two-sided 24-month window around the month in which a target is engaged. In Columns 1 to 4, we consider targets where the decrease in downside risk, measured using *VaR* or *LPM*, from before to after an environmental engagement is above (Large) the median. The dependent variable in Columns 1 and 2 and 5 and 6 is *# E incidents*, which is a measure of the number of severe environmental risk incidents in a firm-month. In the construction of the measure, more severe incidents receive higher weights. The dependent variable in Columns 3 and 4 is *# Novel E incidents*, which is a measure of the number of novel environmental risk incidents in a firm-month. In the construction of the measure, more novel incidents receive higher weights. *Post* equals 1 for firm-month observations after the initial engagement, and 0 before. *Large Decrease VaR* equals one if the decrease in *VaR* from before to after an environmental engagement is above the median, and 0 otherwise. *Large Decrease LPM* is defined accordingly using *LPM* instead of *VaR*. The sample in this analysis includes 99 targeted firms with environmental engagements. Variable definitions are provided in Appendix A. *t*-statistics, calculated based on robust standard errors clustered by firm, are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

Dependent variable:	*# E incidents*		*# Novel E incidents*		*# E incidents*	
Downside risk measure:	*VaR*	*LPM*	*VaR*	*LPM*	*VaR*	*LPM*
Δ Downside risk$_{Pre\ vs\ Post}$:	Large	Large	Large	Large	All	All
	(1)	(2)	(3)	(4)	(5)	(6)
Post	-0.435***	-0.436***	-0.245**	-0.267**	-0.039	-0.057
	(-2.90)	(-3.30)	(-2.07)	(-2.39)	(-0.29)	(-0.42)
Large Decrease VaR					0.382**	
					(2.06)	
Post x Large Decrease VaR					-0.359**	
					(-2.03)	
Large Decrease LMP						0.619***
						(3.05)
Post x Large Decrease LPM						-0.291*
						(-1.71)
Time Trend	0.000*	0.001*				
	(1.66)	(1.80)				
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Model	Poisson	Poisson	Poisson	Poisson	Poisson	Poisson
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry x Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	2,222	2,272	2,222	2,272	4,439	4,439
Ps. R-sq.	0.431	0.408	0.358	0.344	0.313	0.317

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