The Impact of Corporate Environmental Violations on the Cost of Financing*

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Abstract

In this study, we explore the extent to which investors penalize US corporations when they issue debt or equity (SEO) following an environmental violation. Using matching techniques and a dataset containing all the Environmental Protection Agency's (EPA) and other state environmental agencies' fines and deal-level issuing activity information from 2000 to 2019, we find that the cost of financing is higher for firms that issued debt or equity after an environmental violation. The economic impact of these effects is 5% for debt and 50% for equity. Besides, environmentally misconducted firms are more likely to issue debt (9%) and equity (16%) than the average non-penalized firm in the market. We document that these price effects are heterogeneous. We find stronger effects when fines are large, for firms operating in polluting industries, and for firms facing high levels of information asymmetry. We also find that investor attention matters, with a strong effect on debt (equity) when the level of investor attention is low (high). Importantly, we find that our results are not driven by financial constraints. Finally, our results are robust to the inclusion of CRS/ESG ratings suggesting that the market is able to incorporate into prices the negative impact of corporate wrongdoings, beyond the current CRS/ESG performance of firms.

Keywords: Environmental Violations; Corporate misconduct; Debt issuance, Seasoned equity offering, CSR, ESG.

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1 Introduction

There is an increasing interest in academia about the changes in firms' awareness about their negative and positive externalities when firms compete in their markets. That is why different ratings associated with ESG (and CSR) performance have emerged to help consumers and investors to differentiate socially responsible firms from firms with lower environmental and social standards that are more likely to commit corporate wrongdoings when they operate. However, prior literature has also shown evidence that firms often engage in greenwashing activities to mitigate the negative impact of corporate misconduct. They do so by improving their performance on social and environmental dimensions before and after of a misconduct as a way to reduce potential penalties imposed by the regulator, costumers and investors (Hong *et al.*, 2019; Ferrés and Marcet, 2021; Akey *et al.*, 2021). Hence, this prior evidence raises the issue of whether investors are able to incorporate into the price the negative impact of corporate wrongdoings, efficiently.

For investors, this could be challenging, as corporate misconduct may be preceded by new ESG efforts from firms as a direct consequence of the greenwashing, often used as a tool for reputational repair. In addition, currently available data for measuring firm greenness is imprecise, self-reported, and unaudited, which difficult an appropriate empirical assessment of the true environmental standard of firms. For example, Berg *et al.* (2022) compare to what extent environmental, social, and government (ESG) ratings consistently capture each of these dimensions at the firm level. Evaluating a set of six rating providers, the authors identify a systematic divergence among ESG ratings, explained mainly by differences in how different concepts are measured and the scope of the elements included in the index. In addition, recent evidence highlights conflicts of interest among ESG rating providers when assessing firms with commercial ties. These conflicts of interest result in biases in environmental, social, and governance ratings (Li *et al.*, 2024). Ratings tend to be higher for firms with stronger commercial ties to the ESG provider. Overall, the divergence in ESG ratings and the presence of conflicts of interest make it

difficult to evaluate the sustainability performance of firms and challenge investors' ability to incorporate the impact of environmental violations into pricing.

This research aims to overcome the greenwashing, conflicts of interest and measurement problems by directly linking environmental violations with bond issues and equity offerings. Our empirical design provides an ideal setting in which investors have to provide more financing to firms that just committed environmental violations. We argue that when debt and equity issuances are preceded by environmental violations within a short period of time (up to a year), it makes it harder for firms to engage in greenwashing activities or to deliberately influence ESG ratings before raising capital.

To develop our empirical design, we look at environmental violations available for a large sample of US firms. From *Violation Tracker* data set we collect more than 13,000 environmental violations sanctioned by the Environmental Protection Agency (EPA) and other state regulatory agencies in conjunction with the EPA between 2000 and 2019 and we link them with debt and equity issuances. EPA is a nationwide agency that monitors the environmental performance of all companies (public and private) and tracks the environmental violations of all companies at the plant level. There is a growing body of literature studying how EPA enforcement actions affect corporate policy decisions, which are important for firms and managers. For instance, Dasgupta *et al.* (2023) examine the green investment decisions of a local firm following EPA enforcement actions against peer firms competing in the same product market. Lel (2024) find that CEOs of firms subject to EPA enforcement face challenges in the job market as outside directors and have a higher probability of turnover as CEOs. Thus, environmental violations and the sanctions imposed by the EPA are relevant for firms and insiders. Nevertheless, the open question remains whether shareholders and bondholders can assess the impact on debt and equity value before providing additional funding to the fined firm.

In addition, from *LSEG SDC Platinum* database, we obtain the exact date and characteristics of bond emissions and seasoned equity offerings (SEO) for the same sample

period as environmental violations. Then, by putting together this two sources of information, we identify all the environmental violations that took place immediately prior to the issuance of debt or equity to test whether investors incorporate into prices the negative effect of corporate misconduct, above and beyond the ESG performance of firms. On one hand, violating environmental regulations indicates a lack of commitment to the environment and society of these firms; therefore, they provide a clear signal for investors regarding the environmental commitment of these firms that could negatively affect future cash flows (sustainability). On the other hand, by focusing on new bond emission and SEOs, we are considering a subset of investors (more sophisticated) that are willing to provide more funding to firms in need of a fair price. We argue that is more likely that those investors know firm's wrongdoings before the company raises capital.

We aim to investigate whether investors involved in the financing deals react to environmental violations by asking for a higher spread in bonds and a higher stock discount in seasoned equity offerings when deals are associated with environmental violations. Our results show this is the case as we document higher spreads for bond issues and higher price discounts in SEOs after the fines imposed by the environmental agency. Economically, however, the effect on debt is significantly lower than on equity. While for issued debt, we find an increase of 10.78 bps (5% with respect to the sample mean) in the spread for fined firms, in the case of SEO, the price discount is 2.1% higher (almost 50% larger with respect to the sample mean). We also find that the probability of issuing debt and equity after the fine increases by 9% and 16%, respectively. In other words, penalized firms issue more in the expensive market (equity), evidence that we interpret as market punishment on these firms due to environmental violations.

We perform different cross-sectional tests to support our results. First, we find that the size of the penalty is large for large fines, which is consistent with the increase in sustainability risk associated with the firm's operations and the more attention that the firm receives from the media, and therefore, from investors. We also find that investors

ask for higher spreads after an environmental violation in polluting industries, although non-polluting firms are also affected, the impact is smaller. A similar result is found for SEOs, in which the bulk of the market penalty is concentrated only in polluting firms.

One concern about our results is that the likelihood of having an environmental misconduct could be correlated with the level of financial performance of firms. For instance, firms with higher financing constraints might be unwilling or unable to pursue new investments to comply with the environmental standards (e.g., carbon emissions) imposed by the EPA or any state-environmental agency, which makes those firms more likely to suffer an environmental violation in the future. If that is the case, the higher bond spread and stock discount that we observe after an environmental violation could be mainly driven by the financial difficulties that the firms are facing in raising capital. To rule out this alternative explanation we split the sample into financially constrained and unconstrained firms and we do not find a particular pattern between the two groups as the results vary depending upon the proxy of financial constrained considered. Thus, these results suggest that investors impose an additional cost on firms that need to raise more capital even after controlling for the level of financing constraints.

Asymmetric information plays an important role in debt and equity issuances (Jensen and Meckling, 1976; Leland and Pyle, 1977; Derrien *et al.*, 2016). We also provide further evidence that depending on the level of asymmetric information a negative corporate event such as an environmental violation may affect the cost of funding differently. Using traditional proxies (age, analyst coverage and bid-ask spread) for asymmetric information (Kelly and Ljungqvist, 2012; Derrien *et al.*, 2016), we find that the impact of an environmental violation just before a firm raises capital (bonds and SEOs) is larger on firms with higher levels of asymmetric information. Importantly, firms that issue more equity after the misconduct are the most affected by information asymmetries, which is consistent with the pecking order theory in which equity is more sensitive to information disclosure than debt (Myers and Majluf, 1984).

We also study the heterogeneous impact of environmental violation on the cost of financing depending on the level of investor attention. From previous literature, we know that investor attention affects stock returns (see, e.g., Chen *et al.*, 2022; Andrei and Hasler, 2015), the asset pricing following important news (Curtis *et al.*, 2014), trading schemes around environmental misconduct (see, e.g., Wei *et al.*, 2020) and the access to debt financing (see, e.g., El Ghoul *et al.*, 2023). We find that the effect varies depending on the level of investor attention to the firms: while for debt, we observe a strong effect on low-attention firms, for equity, is the opposite, with a stronger effect on high-attention firms. For debt, our evidence is consistent with results in El Ghoul *et al.* (2023).

Our results contribute to different streams of literature. First, we add to the literature on CSR as a tool to reduce the cost of funding. Previous literature has shown that firms exhibiting higher CSR scores experience a mild adverse market reaction to SEO announcements (see Feng *et al.*, 2018; Dutordoir *et al.*, 2018). However, SEO proceeds are kept as cash and not used in investing activities, as we would expect if these CSR activities would aim at enhancing shareholder value. These contradictory results (lower SEO discounts and its use of proceeds) may be explained by the use of a specific CSR score.[1] Economidou *et al.* (2023) relate ESG scores with the IPO underpricing as a way to show that firms with high ESG scores before the IPO exhibit higher returns on the first day of trading. However, they rely on the coverage of a single rating and the level of information environment is different between an IPO and a SEO. We contribute to the previous literature, by showing that our approach will help to overcome the measurement problem described above and directly link the SEO stock discount with environmental violations.[2]

[1]This result is puzzling considering that prior literature has shown that firms typically increase their capital expenditures and research and development following an SEO (see, e.g., Walker and Yost, 2008).

[2]Becchetti *et al.* (2023) investigate the impact of reputational ESG risk, proxied by media coverage of corporate misconduct, on the implied cost of equity. The authors confirm that higher reputational ESG risk is associated with a higher cost of equity. We differ from them in the use of environmental fines (with specific events and dates) rather than news-based misconduct where it is not possible to identify the exact timeline of the negative events that could affect investors when they provide funding, and we focus on the market cost of financing during equity issuance rather than the implied cost of equity computed during not-issuance periods.

On the debt side, Ma *et al.* (2022) and Gu *et al.* (2023) have shown that firms involved in environmental violations or lawsuits that affect their reputation face tightening debt borrowing conditions in China. Graham *et al.* (2008) show that corporate misreports, a type of firm misconduct, negatively affect the characteristics of loan contracts after the event compared to those loan contracts set before the event (high loan spreads, shorter maturities, etc.). Chava *et al.* (2018) also show that revelations of financial misreporting by borrowers negatively affect loan contracts for these firms. These authors show that misreporting firms pay greater loan spreads during the next six years of the misreporting event. However, this kind of misconduct affects the assessment of the true firm value rather than the impact of environmental violations on the cost of funding. It is important to note that the penalty imposed by the EPA could affect future cash flows (higher compliance costs), increasing the cost of funding.[3]

Our study also fits in the literature on the effect of environmental violations on market value.[4] Konar and Cohen (2001) study the impact of environmental measures on firm intangible assets, proxied by the Tobin's-q, for a sample of US S&P 500 firms. They find that firms involved in environmental lawsuits and with a high level of toxic chemicals emitted per firm reduce firm intangible assets. Karpoff *et al.* (2005) studied the impact of environmental violations on firm equity. Using a sample of US firms, they document that firms that violate environmental regulations suffer lost market value. This loss is akin to the fines received by these firms. Then, they conclude that there are no reputational losses associated with environmental violations. Along the same lines, but not looking at

[3] Goss and Roberts (2011) and Wellalage and Kumar (2021) document positive impacts of environmental performance on the cost of bank loans for listed firms in the U.S. and a set of international unlisted firms, respectively. Eichholtz *et al.* (2019) show that a high environmental performance reduces the cost of bond debt in commercial mortgages and property companies (REITs) in the U.S. Similar to the SEO literature discussed previously, Newton *et al.* (2024) shows how reputational ESG risk affects debt choices. The authors find that firms with higher ESG reputation risk rely more on public bonds than on bank loans. However, different from our findings, they show that the social and governance components drive these results.

[4] There are at least two channels through which this may happen. First, a discount channel in which the cost of capital is affected, and second, a cash-flow channel in which future cash-flows decrease. Derrien *et al.* (2022) provide evidence favoring the second channel when looking at the impact of negative ESG news on firm value. Our study aims to provide evidence on the first channel.

environmental events specifically, Karpoff *et al.* (2008) study how firm misconduct, particularly financial misrepresentation, affects a firm's market value and reputational costs using a sample of 585 firms targeted by SEC enforcement actions between 1978 and 2002. They document that the legal penalties are minor compared to reputational costs imposed by the market. For each dollar, a firm misleadingly inflates its market value lost $4.08 due to reputational losses. Armour *et al.* (2017) conduct a similar exercise for a sample of UK firms. Exploiting a peculiarity in the UK market regarding the timing in which information about misconduct is released to the market, they document that reputational losses are significant, nine times the amount of legal fines paid. The reduction in market value is mainly observed when investors and customers are harmed, but not third parties. Hossain *et al.* (2024) documents significant reputational losses for Chinese companies fined after environmental violations. The negative impact on stock returns is sizeable despite that most of the monetary fines are small.

Summarizing, we contribute to the literature in several ways. First, we provide a comprehensive empirical analysis of the impact of environmental misconduct on the cost of financing using EPA's environmental fine data for all the firms in the US. We divert from most recent studies using ESG score or ESG reputational risk information obtained from commercial vendors. In this way, we cope with the problem of ESG score mismeasurement present in the literature (Berg *et al.*, 2022). Second, we are one of the first studies looking jointly at the impact of environmental violations on the issuance of debt and equity (SEO). Most of the prior literature focused its analysis on one of them only. Our way of proceeding gives a more comprehensive picture of the impact of environmental violations on the set of the most important financing alternatives available for firms in the market.[5] Thus, we can provide a fair comparison among alternatives of financing and

[5] Li *et al.* (2019) shows, in a brokerage merger and closures framing, that information asymmetries have a first-order impact on a firm's financial decisions. They document that an exogenous increase in information asymmetries leads firms to substitute public debt and equity for bank debt. Our results go partially along the same lines, as we document that a reduction in information asymmetries, due to the release of the environmental violation fines information to the market, increases the probability of issuance of debt and equity (see section 4 below).

frame our analysis in the classic pecking order theory (Myers and Majluf, 1984). Finally, our results have value on their own, as we show that the impact of environmental misconduct differed significantly between debt and equity markets. While for the former the impact is mild (5%), for the latter is sizeable (50%). This novel result deserves further scrutiny.

The remainder of the paper proceeds as follows. In section 2, we describe the different sources of information used in this study and the empirical model. In section 3, we present the baseline pricing results. In section 4, we investigate the propensity of issuance debt and equity for environmentally penalized firms. In section 5, we explore several cross-sectional heterogeneity in our baseline pricing results, and finally, we conclude in section 6.

2 Data and Empirical Model

2.1 Dataset

We merge five datasets to conduct our empirical analysis. We work with information on all the environmental fines applied to U.S. firms by the *Environmental Protection Authority* (EPA) and other state regulatory agencies in conjunction with the EPA, collected in the *Violation Tracker* database. Bond issues and seasoned equity offering (SEO) information at the deal level is obtained from *LSEG SDC Platinum* database accessed through *LSEG* (formerly known as *Refinitiv Eikon*). We control by firm's CSR and ESG performance using score information based on *KLD* and *MSCI ESG* databases. Additional control variables at the firm level are retrieved from *COMPUSTAT* database; and stock price information is obtained from *CRSP*. Our study spans the sample period from 2000 to 2019.

In *Violation Tracker* database, our focus is on corporate violations in which the primary offense was classified as an "environmental violation". *Violation Tracker* also includes environmental violations of state agencies, however, EPA is the most comprehensive source

of information. Once we collect the violations, we track on a daily basis the environmental violations of all the firms in the sample and we aggregate, in a rolling window of 365 days, the violations of each firm.

We collect information about bond issues and SEOs from *LSEG SDC Platinum*. In particular, for bond issues, we obtain information about the spread to the treasury bond of reference (in base points) of the bond on the issue date, maturity, coupon rate, credit rating, and amount. Concerning SEOs we collect the issue discount (percentage) measured as the close price at the filling date divided by the offer price, minus one. Importantly, for bond issues and SEOs we consider the issue date as the key date to link past environmental violations (365 days before the issue date) to debt issue and equity offerings.

We measure CSR using data developed by the for-profit company Kinder, Lydenberg, Domini Research & Analytics (*KLD*), which was later acquired by *MSCI*. This data set has a more ample sample coverage (in terms of years and number of companies) than alternative metrics available in the market, and it has been used most frequently in academic studies (Berg *et al.*, 2022). Considering that KLD ratings (Strengths/Concerns) change over the years, we follow Albuquerque *et al.* (2019) and normalize the CSR Strengths, CSR Concerns and CSR Score to make them comparable over the years. As a robustness test, we also considered the new *MSCI ESG* scores.

Accounting information to construct different control variables is retrieved from COMPUSTAT database. For instance, *Size*, *Profitability*, *Tangibility*, *MTB*, *Log(Sales)*, *Cash/TA*, *Div/TA*, *ROA*, *Book Leverage*, *Cash Flow*, *Innovation*, *R&D/TA* and *Firm Age*. Also, we construct as a proxy of financial constraints the Whited-Wu index (Whited and Wu, 2006) and the Kaplan-Zingales index (see Lamont *et al.*, 2001). Stock price information from CRSP is used to construct a proxy for asymmetric information, the bid-ask spread. Finally, We obtain from *IBES* database information about the analyst coverage of the firms issuing bonds and equity. Our news activity data (*BUZZ*) is obtained from *Marketpsych* Data, provided by *Thomson Reuters*. The *BUZZ* variable measures the number of news items

associated with each firm, including content from formal news outlets and social media platforms.

2.2 Empirical Model

We estimate the following empirical model for a sample of matched firms

$$y_{it} = \beta_0 + \beta_1 1(Env.\ misconduct_{it}) + \beta_2 CSR/ESG_{it} + \Gamma' X_{it} + \eta_{ind} + \delta_t + \varepsilon_{it}, \qquad (1)$$

where y_{it} is either the debt issuance spread in bps (spread) or the SEO's issuance discount (issue discount) of firm i at year t. The dummy variable $1(Env.\ misconduct_{it})$ takes the value of 1 if the firm has received an environmental fine by the U.S. Environmental Protection Agency (EPA) within 365 days before the issue date; the CSR/ESG variable represents a dummy variable that takes the value of 1 if the firm is rated by ESG MSCI or CSR KLD (MSCI/KLD Rated), and zero otherwise. In some specifications, CSR/ESG is the CSR or ESG score, respectively. X_{it} is a set of control variables at the security level (for the case of debt) and at the firm level, η_{ind} is a set of 2-digit SIC codes fixed effects, δ_t is a set of year fixed effects, and ε_{it} is a random term. All the regressions are estimated with OLS and robust standard errors and clustered at the industry level (2-digit SIC code).

Importantly, firms committing environmental violations can differ greatly from firms with no environmental compliance issues when they go to the market to raise capital. If this is the case, our results could be driven by differences in firm characteristics or by sample selection. To mitigate these concerns, before estimating Equation (1), we conduct a matching process. Specifically, from the universe of deals, we identify transactions where firms committed an environmental violation before raising capital (treated deals) and transactions where firms had no violations (control deals). We then perform matching using the nearest-neighbor (NN) method with one neighbor for debt issuances and up to four neighbors for seasoned equity offerings (Economidou *et al.*, 2023; Derrien *et al.*,

2016). Results are robust to alternative numbers of neighbors; however, we need more neighbors for SEOs to achieve a larger sample size. Following Dutordoir *et al.* (2018), we match treated deals (fined firms) and control deals within the same industry (2-digit SIC code) and using four firm characteristics: size (log(sales)), leverage, market-to-book ratio, and ROA.

Table 1 shows descriptive statistics of our matched sample for debt issuance and SEO. In Panel A, we report statistics for the variables considered in the matching procedure. We report the mean and median values of the log of sales, leverage, marker-to-book, and ROA variables in the treated and control group, for bond- and SEO-deal samples. P-values of the difference in median test (Median) between treated and control firm; and the Wilcoxon test of differences in distribution are also reported for each of these variables. Evidence in Panel A validates our matching procedure as we do not observe significant differences between the firms in the treated deals and the control group. The Wilcoxon test's null hypothesis of equal distribution is not rejected in any of the matching variables neither for the bond sample nor the SEO sample. The test of differences in medians also does not identify significant differences between firms in the treated and control groups except for leverage in the bond sample, where some differences are observed.

Panel B shows that the average debt spread in our sample is 194 bps, with a standard deviation of 149 bps. The average issue discount for SEO in our sample is 4.14%, with a standard deviation of 11.4%. In our debt (SEO) sample 80% (72%) of the deals have firms rated either by *MSCI* or *KLD*.

Table 2 shows the number of treated firms in our matching exercise and its mean penalty size. We have 1,024 treated firms (and the same number of control firms) that have issued debt with an average penalty across years of $ 2.1 million, and a sample of 250 treated firms (and 787 control firms) with SEO with an average penalty of $ 1.8 million. As a reference, in the last column, we report the average penalty for the whole set of environmental fines imposed by the EPA during the analyzed period. In this case, the

average fine is $ 1.5 million. Overall, we find variation in the size of the penalties across years; however, on average, the size of the penalty is consistent with the sample mean from *Violation Tracker*.

3 Empirical Results: Pricing Effects

Table 3 shows different estimates of equation (1) for a matched sample of firms. Panel A shows the results for issued debt, in which the dependent variable is the debt spread measured in basis points, and panel B shows the results for SEO events, in which the dependent variable is the issue discount calculated as the percentage difference between previous day price and the offer price. A higher debt spread or issue discount would indicate a higher cost of financing for these firms associated with a market penalization due to environmental violations. The key dependent variable in our analysis is a dummy variable indicating whether the firm was fined by the EPA due to environmental misconduct during the last year ($1(Env.\ misconduct)$).

We add an extensive number of control variables. Firstly, we control whether the firm is rated either by ESG MSCI or CSR KLD (*MSCI/KLD Rated*) using a dummy variable taking the value of 1 in the cases in which the firm is rated and 0 if not. In other specifications, we replace the rated dummy with the respective scores (ESG MSCI or CSR KLD). Secondly, we add a large set of firm-specific characteristics, and for bond issuances, we add instrument-specific control variables. Finally, all the estimated models include time and (2-digit SIC codes) industry fixed effects. Regarding firm characteristics, we control for firm size, profitability, tangibility, book-to-market (*MTB*), cash, dividends, ROA, leverage, cash flows, innovation expenses, and age. For bonds, we control for bond proceedings, maturity, coupon rate, yield-to-maturity (*YTM*), and Moodys rating score.

Column (1) in Panel A shows that having incurred an environmental violation during the last year increases the cost of issuing debt for these firms by 10.78 basis points. The

estimated coefficient is significant at the one percent level. Column (2) shows that this effect remains after controlling for whether CSR KLD or ESG MSCI rates the firm. In this case, the estimated effect is an additional debt spread of 11.04 basis points, while the estimated coefficient of the rated dummy is negative (-5.26) but not statistically different than zero. Results in columns (3) and (4) show similar results to the previous ones when we replace the rated dummy with the CSR KLD and the ESG MSCI scores, respectively. In these two cases, the estimated effects of environmental violations are an additional debt spread of 11.38 and 10.29 basis points, respectively. In these two last specifications, the estimated effects of CSR KLD and ESG MSCI scores are not statistically significant. Economically, the impact of environmental violations on the cost of issuing debt is mild. As compared with the average debt spread of 194 bps in our sample (see Table 1), these estimates represent a 5% increase in the cost of issuing debt for penalized firms.

Panel B shows the results for SEO. Column (5) shows a positive and statistically significant impact of environmental violations on the cost of issuing equity. The estimated impact is an additional issue discount of 2.15%. Columns (6) repeat the previous exercise but include as additional control the MSCI/KLD rated dummy. The estimated effect of environmental violation remains positive (2.08%) and statistically significant. Akin to the case of debt, the rated dummy is not statistically different than zero. In Column (7), we replace the rated dummy with the CSR KLD score. Now the estimated effect on the issue discount is slightly smaller (1.62%) but still statistically significant. Finally, in Column (8), we control for the ESG MSCI score instead of the rated dummy, and we observe a positive (1.26 %), but statistically insignificant impact of environmental violations on the issue discount. From an economic point of view, the estimated impacts on the issue discount are highly significant as they present an increase of around 50% considering that the average issue discount in our sample is 4.13% (see Table 1). This indicates that investors in equity market applied a significantly stronger penalty than those operating in the debt market to firms raising capital after an environmental violation.

An interesting result obtained for both samples is the lack of statistical significance of the CSR/ESG scores evaluated (the rated dummy, the CSR KLD score, and the ESG MSCI score) vis-a-vis the real information about environmental misconduct contained in the fine dataset. A straightforward interpretation of this result is that real misconduct information provides better information for investors than CSR/ESG scores from commercial vendors. These results support the view that CSR/ESG scores do not necessarily provide accurate information about the CSR/ESG stance of the firm and that real data (environmental violation fines) is more accurate in this respect (see e.g., Berg *et al.*, 2022).

Finally, regarding the other determinants of the issuance spread/discount we find the following: in Panel A, the debt spread is small for bonds with more proceedings, long maturity, high coupons, low yield to maturity, and high credit ratings. At the firm level, the debt spread is small for small, low cash, low dividends, high profitability, high innovation, and old firms. For equity, in Panel B, we observe that a low issue discount is associated with high profitability, high market-to-book, high innovation levels, and low levels of cash and cash flows.

4 Empirical Results: On the Probability of Issuance

We have just shown that firms fined due to environmental violations faced higher costs of financing with debt and equity. Economically, though, the cost of the latter is significantly higher than the cost of the former. In this section, we assess whether environmental violations affect the probability of issuance for these firms. We complete this exercise by estimating probit models in a sample of matched firms. In this case, the matching estimation is completed in a larger sample of firms as in addition to including firms issuing debt or equity as in the previous pricing results, we include firms that have not issued securities during the analyzed period. This increases our sample size significantly. The matching exercise used the same set of firm characteristics as in the previous section to

identify the control group.[6]

Table 4 shows our results. Our dependent variable is a dummy variable taking the value of 1 if a firm issued debt or equity and 0 otherwise. As before, the main regressor variable in the model is the dummy variable indicating whether a firm has been fined by the EPA due to environmental violations. We control for firm-level CSR/ESG scores including across specifications the MSCI/KLD rated dummy, and the CSR KLD and ESG MSCI scores, respectively. We include as additional control variables the same set of firm-level characteristics and bond-specific characteristics as in Table 3. 2-digit SIC-code industry fixed effects and year-fixed effects are included throughout.

Panel A shows the results for the probability of debt issuance. Column (1) shows that the probability of issuing debt is higher for firms fined due to environmental misconduct compared to firms that have not issued. This probability is almost 9% higher as shown by the estimated marginal effect at the bottom of the table. In Column (2), we add the rated dummy to the previous specification, and we again observe an increase in the probability of issuance by fined firms of 8.8%. Interestingly, the rated dummy is positive and highly significant, indicating that rated firms are more likely to issue debt than not-rated firms. In columns (3) and (4), we include the CSR KLD and ESG MSCI scores instead of including the rated dummy. The results show a positive, but not statistically significant, estimated coefficient of the environmental misconduct dummy. In other words, after controlling for CSR/ESG scores, the probability of issuance of debt by environmentally fined firms is not different than the control group of firms without penalties.

Panel B shows estimates of the probability of a SEO in our sample of matched firms. Column (5) shows that is more likely for environmentally penalized firms to issue equity

[6]In Panel A of Table A1 in the appendix, we compared the median and the whole distribution of the variables used in the matching exercise (*Size*, *Leverage*, *Market-to-Book* and *ROA*). Overall, our matched sample is well-balanced. We generally cannot reject the null hypothesis of equal medians or distributions at standard levels of confidence. Only ROA for the debt sample shows a Wilcoxon test with a p-value of 4.7%. However, we believe this issue does not affect our results, as we find similar coefficients when adjusting the matching specification. We prefer to retain this matching as it is consistent with our baseline results (pricing effect).

than firms that have not been penalized. The estimated marginal effect shows that the probability of issuance increased by a sizeable 19.6%. We observe similar results after controlling for the rated dummy in Column (6). There is a 16.1% more chance that a penalized firm issue equity than a not-penalized one. In this specification, the rated dummy is positive (0.412) and statistically significant, indicating that CSR/ESG-rated firms are more likely to issue equity than those that are not. Estimates in Columns (7) and (8) replace the rated dummy with the CSR KLD and ESG MSCI scores, respectively. As before, we also observe an increase in the probability of SEO for environmentally-misconducted firms. The estimated marginal effect is 10.86% and 15.1%, respectively. The estimated effects for the CSR KLD and the ESG MSCI scores show dissimilar results, while the CSR KLD score estimate is positive (0.015) but not statistically significant, the one for the ESG MSCI score is negative (-0.091) and statistically significant.

Overall, the results in this section show that firms experiencing environmental misconduct are more likely to issue equity and marginally more likely to issue debt. Considering our previous pricing results showing a strong detrimental cost of issuing equity rather than debt for environmentally penalized firms, we can conclude that these firms are forced to some extent to raise capital in the equity market where they are penalized by investors the most.

5 Heterogeneous Effects

In this section, we study cross-sectional heterogeneity on the pricing effects reported in Section 3. We start studying the differential effect by the size of the fine imposed by the EPA, and then we look at the pricing effects in polluting and non-polluting industries. Also, we investigate the role of financial constraints, information asymmetries, and investor attention levels in explaining our baseline results. To perform the heterogeneity exercise, for each of the firm characteristics of interest, we split the sample in two (above

and below the median in a given year) and reestimate our baseline specification in equation (1) on our sample of matched firms. For brevity, tables report only the coefficient of interest, while including all the control variables considered in our baseline results. Specifically, we follow the specification presented in Column (2) for debt issuance and Column (6) for SEOs of Table 3.

5.1 The Size of the Penalty

Our baseline results quantify the effect of environmental violations on the cost of financing for an average firm in our sample. Considering that the size of the penalty varies in our sample, it is expected to find stronger results in those firms receiving large environmental fines. Table 5 shows our results. Panel A shows the results for debt issuances and Panel B for SEO. For debt, the effect of environmental misconduct in the previous year is 9.02 basis points for small fines and 13.16 bps for big fines. Both effects are statistically significant. For SEOs, we observe a positive but not statistically significant effect for small fines, while a positive (2.88%) and statistically significant effect for big fines. Thus our results confirm the prior that investors penalize more large negative events in which fines are large.

5.2 Pollutting vs Non-Polluting Industries

Table 6 shows estimates of environmental misconduct on the cost of financing for polluting and non-polluting industries, respectively. Following Berrone *et al*. (2013), we classify as polluting industries the 20 most polluting U.S. sectors defined by the following two-digit SIC codes: 10, 50, 33, 49, 28, 36, 12, 13, 20, 32, 30, 51, 26, 34, 29, 31, 35, 37, 24, and 27. The remaining industries are classified as non-polluting. Panel A shows the estimated effect for debt issuances. While we do not find any statistically significant effect in non-polluting sectors, we find an increase of 13.66 bps in the debt spread for firms operating

in polluting sectors. Panel B shows the impact on SEOs. Here again, we find a stronger effect on polluting industries compared to non-polluting ones. For polluting industries, the impact of environmental misconduct on SEO issue discount is 2.24%, while for non-polluting ones, the estimate is not statistically different from zero. Overall, we observe a stronger impact on the cost of financing for firms operating in polluting industries.

5.3 Financial Constraints

The issuance cost of debt and equity certainly could be different for firms facing financial constraints than those that do not. Therefore, a priori, we could think that our main results reported above about the identified impact of environmental misconduct on the cost of financing may be driven by this limited access to capital rather than a pure misconduct effect. To address this concern, in this section we look at several proxies of a firm's financial constraints and assess the differential impact of misconduct on the cost of debt and equity for firms with low and high financial constraints levels. As proxies of financial restrictions, we use the stock of cash as a percentage of total assets (cash), the cash flows as a percentage of total assets, the Whited-Wu index (Whited and Wu, 2006), and the Kaplan-Zingales (KZ) index (Lamont *et al.*, 2001).

Table 7 shows our results. Panel A shows the results for debt spreads. For the case of cash, we find that both low and high financially-constrained firms are penalized by investors similarly. For financially constrained firms, for those with low levels of cash, the effect of environmental misconduct is 10.49 bps, while for firms not financially constrained, i.e. with high levels of cash, the effect is 11.60 bps. When financial constraints are proxied by the cash flow ratio to assets, we observe again that both low and high-constrained firms are penalized after an environmental violation. The estimated impact is larger for less financially constrained firms (high cash flow ratio) with an estimate of 11.36 bps, while for financially constrained firms (low cash flow ratio) the impact is 8.72 bps. The WW index shows again that both financially-constrained and non-

financially-constrained firms are penalized by investors after environmental misconduct, but a stronger effect is observed in the latter where the estimated impact is 9.43 bps compared with 6.85 bps for constrained firms. Finally, the KZ index identifies impact only for financially constrained firms, while no statistically significant effect appears for financially unconstrained firms. Taking all this evidence together, it seems that firms' financial constraints do not explain our baseline results regarding the impact of environmental violations on the cost of issuing debt.

Panel B shows estimates for SEO issue discounts. When financial constraints are proxied by the stock of cash, we identify a statistically significant effect of environmental misconduct only for financially constrained firms (low cash ratio). The estimated impact in this case is 2.20%. No effect is observed for unconstrained firms. In the case of cash flows, we find no effect whatsoever. For both, constrained (low cash-flow ratio) and unconstrained (high cash-flow ratio) firms, the effect of environmental misconduct is not statistically different from zero. The WW index identifies a stronger effect of environmental misconduct on the issue discount of SEO for non-financially constrained firms. In this case, the estimated increase is 2.83%. A similar result is observed using the KZ index, where again, only non-financially constrained firms are penalized with a statistically significant increase of 2.9% in the issue discount. Overall, from this evidence, it is not completely clear whether being financially constrained plays a role in explaining the impact of environmental misconduct on the cost of issuing equity. If any, based on the evidence from the WW and KZ indexes, the impact is most prevalent in financially unconstrained firms.

5.4 Information Asymmetries

Information asymmetries play a significant role in debt and equity issuances (Goswami *et al.*, 1995; Klein *et al.*, 2002; Bowen *et al.*, 2008). Agency problems between lenders and managers may be mitigated by firm information disclosure, reducing the cost of exter-

nal financing. Thus, identifying a differential effect of environmental misconduct on debt spreads and equity discounts by the level of information asymmetry of the firm is worthy. In this subsection, we perform that analysis using three proxies for asymmetric information: firm age, analyst coverage, and the bid-ask spread. For instance, analyst coverage has been used by Derrien *et al*. (2016), which shows that a lower coverage implies an increase in the cost of debt of 25 bps. Also, firm age and bid-ask spread have been used as proxy for asymmetric information in prior literature. (see, e.g., Leary and Roberts, 2010; Kelly and Ljungqvist, 2012).

Table 8 shows our results. For the case of debt issuance, in Panel A, we observe that young firms are more penalized than old firms. The estimated effect for young firms is positive (14.57 bps) and statistically significant. On the contrary, we find no effect for old firms. Considering the analyst coverage as a proxy of information asymmetry, we find that the effect of environmental misconduct is positive and statistically significant for both low-coverage and high-coverage firms, being the effect of the former slightly higher than the latter (12.11 bps vs 10.37 bps). Regarding the bid-ask spread, we observe that firms facing higher informational asymmetries (high bid-ask spread) are more affected by environmental misconduct with an estimated coefficient of 12.38 bps, while low bid-ask spread firms are not affected as the estimated coefficient is not statistically different from zero. Overall, this evidence shows that the higher the level of information asymmetries, the stronger the penalty of investors to firms issuing debt after an environmental violation.

Panel B shows estimates for SEO discounts. Young firms are more penalized by the investors than old firms. While the estimated effect for young firms is 3.04%, the effect for old firms is statistically zero. Firms with low analyst coverage are more penalized than firms with high coverage. The effect for low-coverage firms is 3.23% while the effect for high-coverage firms is null. Looking at bid-ask spread splits, consistent with the results for young and low-coverage firms, we find that those firms with high spreads, i.e.

with high information asymmetries, are more affected by an environmental violation than firms with low spreads. The effect for high-spread firms is 4.87% and for low-spread firms is statistically zero. In sum, our proxies for information asymmetry support the idea that firms with more information asymmetries are more penalized by investors when issuing equity following an environmental violation.

Finally, it is worth mentioning that as dictated by agency theory models and previous evidence (Myers and Majluf, 1984; Narayanan, 1988; Brav, 2009; Lemmon and Zender, 2019), the impact of information asymmetries is stronger in the equity market than in the debt market. In our setting, under an environmental shock that could affect the sustainability of future cash flows, investors should react strongly when the level of asymmetric information is high. Thus, our results are consistent with prior evidence.

5.5 Investor Attention

Finally, we test whether investor attention is relevant for bond and SEO pricing after an environmental violation. From previous literature, we know that investor attention affects stock returns (see, e.g., Chen *et al.*, 2022; Andrei and Hasler, 2015), trading schemes around environmental misconduct (see, e.g., Wei *et al.*, 2020), and access to debt (see, e.g., El Ghoul *et al.*, 2023). Because of this evidence, we should expect to observe some differential effects in our estimates.

Table 9 shows the results of evaluating the impact of environmental violations on the cost of issuing debt (Panel A) and equity (Panel B) for firms with high and low levels of investor attention. A firm has a low (high) level of investor attention if its trading volume is low (high) or its coverage in the news, measured by the BUZZ from *Thompson Reuters MarketPsych*, is low (high). For the case of debt, we observe that firms facing low investor attention are more penalized by the market than firms with high levels of attention. For example, firms with low trading volume face an extra 10.23 bps after environmental misconduct, while firms with high trading volume are penalized with 8.15 bps. When we

look at the impact of news coverage, low-coverage firms are penalized with an additional 11.62 bps after environmental misconduct, while high-coverage firms are not penalized by the market. Our evidence for debt is consistent with recent results by El Ghoul *et al.* (2023) that show that firms with higher institutional shareholder inattention face higher costs of debt.

Interestingly, in the case of equity, we find the opposite: higher investor attention is associated with higher issue discounts. For example, while firms with low trading volume are not penalized by the market after an environmental violation, high-trading-volume firms receive an extra issue discount of 2.69%. When we focus on news coverage as a proxy of investor attention, we find that low-coverage firms are not penalized and high-coverage firms are penalized with an extra 2.09% in the issue discount.

Overall, we document heterogeneous effects of environmental violations on the cost of financing depending on the level of investor attention. While for debt, the effect is stronger for low-attention firms in line with evidence in El Ghoul *et al.* (2023), in the case of equity the effect is stronger in high-attention firms.

6 Conclusions

In this study, we investigate to what extent the cost of financing is affected for firms after incurring in an environmental violation. In particular, we investigate the effects on the cost of issuing debt (debt spread) and issuing equity (SEO's issue discount). Using matching estimates and a sample combining all the Environmental Protection Agency's (EPA) fine and deal-level issuing information for US firms in the period 2000 to 2019, we find that this is indeed the case: firms raising capital faced higher costs of financing after an environmental violation in the previous year. We document an economically significant effect of a 5% increase in debt and a 50% in equity. Besides, we find that environmentally misconducted firms are more likely to issue debt (9%) and equity (16%) than the average

non-penalized firm in the market. Taking these results together, it seems that penalized firms are forced, to some extent, to raise capital at the highest cost in the equity market rather than access to cheaper financing in the debt market. Our results are robust to the inclusion of CRS/ESG ratings suggesting that the market is able to incorporate into the price the negative impact of corporate wrongdoings, beyond the current CSR/ESG performance of firms.

We document heterogeneity in our baseline pricing results. In particular, we find large effects when fines are large, firms operate in polluting industries, and firms face high levels of information asymmetries. We also find that investor attention matters with a strong effect on debt (equity) when the level of investor attention is low (high). Finally, we do not find that financial constrains explain our baseline pricing results.

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Table 1: **Summary Statistics**

This table reports descriptive statistics for a matched sample of bond (equity) deals. For debt issuances, we obtain 1,024 treated deals and an equal number of control deals; for equity issuances, we obtain 250 treated and 787 control deals, respectively. Panel A presents the summary statistics, median test, and Wilcoxon test for the variables used in matching. Panel B shows the summary statistics for the entire sample (treated and control firms).

Panel A: Matched Sample

	Bond Sample						SEO Sample					
	Treated		Control		Median	Wilcoxon	Treated		Control		Median	Wilcoxon
	Mean	Median	Mean	Median	Test	Test	Mean	Median	Mean	Median	Test	Test
Log(Sales)	9.877	9.895	9.788	9.838	0.16	0.12	8.779	8.732	8.746	8.622	0.502	0.66
Leverage	0.335	0.322	0.338	0.340	0.01	0.23	0.405	0.385	0.400	0.395	0.46	0.98
MTB	1.429	1.174	1.439	1.210	0.72	0.66	1.079	0.939	1.075	0.913	0.27	0.40
ROA	0.056	0.054	0.057	0.054	0.96	0.67	0.009	0.023	0.013	0.023	0.80	0.71

Panel B: Summary Statistics

	Bond Sample						SEO Sample					
	N	*Mean*	*Std*	P25	Median	P75	*N*	*Mean*	*Std*	P25	Median	P75
Spread (bps)	2048	194.51	149.572	95	145	245						
Issue Discount							1037	4.139	11.425	0.873	3.406	6.456
1(*Env. misconduct*)	2048	0.5	0.5	0	0.5	1	1037	0.241	0.428	0	0	0
MSCI/KLD Rated	2048	0.804	0.397	1	1	1	1037	0.728	0.445	0	1	1
CSR KLD	1234	0.022	0.074	-0.027	0.014	0.067	617	-0.009	0.058	-0.042	-0.015	0.015
ESG MSCI	1186	4.734	1.115	4.033	4.625	5.383	414	4.373	1.412	3.2	4.44	5.375
Size	2048	9.832	1.25	8.943	9.872	10.59	1037	8.754	1.374	7.852	8.64	9.877
Profitability	2048	0.142	0.069	0.097	0.136	0.178	1037	0.094	0.082	0.075	0.096	0.119
Tangibility	2048	0.443	0.26	0.202	0.455	0.639	1037	0.534	0.26	0.332	0.574	0.74
MTB	2048	1.434	0.841	0.883	1.182	1.728	1037	1.076	0.652	0.778	0.923	1.159
Cash to Assets	2048	0.056	0.063	0.013	0.034	0.075	1037	0.051	0.101	0.006	0.018	0.053
Dividends to Assets	2048	0.023	0.022	0.007	0.017	0.034	1037	0.012	0.022	0	0.005	0.016
ROA	2048	0.056	0.059	0.027	0.054	0.084	1037	0.012	0.072	0.008	0.023	0.036
Leverage	2048	0.337	0.134	0.244	0.332	0.414	1037	0.401	0.14	0.33	0.392	0.484
Cash Flow to Assets	2048	0.097	0.06	0.063	0.095	0.13	1037	0.056	0.077	0.046	0.057	0.082
Innovation	2048	0.176	0.193	0.02	0.102	0.28	1037	0.145	0.194	0	0.055	0.205
Age	2048	9.833	5.677	5	10	15	1037	6.756	5.581	2	5	10
Debt Proceedings	2048	654	569.06	350	500	750						
Coupon rate (%)	2048	4.866	1.984	3.45	4.875	6.25						
Debt Maturity	2048	11.249	8.304	7.022	10.022	10.088						
YTM(%)	2048	4.908	2.014	3.464	4.924	6.271						
Moodys Rating	2048	13.458	3.203	12	13	16						

Table 2: **Penalty Size of the Environmental Violations**

This table reports the information on the penalty size for bond issues and seasoned equity offerings.

	Debt - Matched Sample		SEO - Matched Sample		Violation Tracker Sample
year	N Treated	Average Penalty	N Treated	Average Penalty	Average Penalty
2001	67	$ 535,738	10	$ 32,749	$ 756,111
2002	58	$ 8,754,672	21	$ 16,539,118	$ 366,328
2003	54	$ 4,591,691	17	$ 13,245,463	$ 1,461,140
2004	31	$ 7,933,857	17	$ 224,428	$ 277,634
2005	30	$ 70,017	8	$ 90,694	$ 1,411,055
2006	27	$ 199,889	10	$ 818,458	$ 307,787
2007	45	$ 4,823,731	8	$ 44,962	$ 2,014,746
2008	49	$ 1,783,901	11	$ 473,225	$ 547,968
2009	63	$ 987,260	19	$ 611,364	$ 438,251
2010	51	$ 783,984	12	$ 97,432	$ 557,296
2011	52	$ 155,239	12	$ 432,180	$ 624,008
2012	74	$ 554,084	12	$ 32,918	$ 3,611,774
2013	57	$ 1,256,612	13	$ 2,333,444	$ 1,255,866
2014	58	$ 1,128,514	12	$ 96,565	$ 394,459
2015	65	$ 497,688	14	$ 34,632	$ 8,025,409
2016	52	$ 320,844	24	$ 175,842	$ 4,352,338
2017	97	$ 545,462	15	$ 83,011	$ 2,953,904
2018	34	$ 1,658,534	11	$ 430,741	$ 624,642
2019	60	$ 6,482,580	4	$ 100,660	$ 657,978
Total	1,024	$ 2,153,215	250	$ 1,794,894	$ 1,571,455

Table 3: **Environmental Violations and the Cost of Financing (Matching Estimates)**

This table presents estimates of the impact of environmental violations on the cost of issuing debt and equity (SEO) on matched samples identified using the nearest-neighbor (NN) matching estimator. We match using the following firm characteristics: sales, leverage, book-to-market ratio, ROA, and industry SIC code. The table presents estimates of the following equation

$$y_{it} = \beta_0 + \beta_1 1(Env.\ misconduct_{it}) + \beta_2 CSR/ESG_{it} + \Gamma X_{it} + \eta_{ind} + \delta_t + \varepsilon_{it},$$

where y_{it} is either the debt issuance spread in bps (Panel A) or the SEO's issuance discount (Pabel B) of firm i at year t; $1(Env.misconduct_{it})$ is a dummy variable taking the value of 1 if the firm has paid an environmental violation fine in the last year issued by the US EPA. The CSR/ESG variable is proxied by a dummy variable taking the value of 1 if the firm is rated by ESG MSCI or CSR KLD (MSCI/KLD Rated), or by the respective score. X_{it} is a set of control variables at the security level and the firm level, η_{ind} is a set of 2-digit SIC codes fixed effects, δ_t is a set of year fixed effects, and ε_{it} is random term. All the regressions are estimated with OLS and robust standard errors.

	Panel A: Debt (Spread, bp)				**Panel B: SEO (Issue Discount,%)**			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1(*Env. misconduct*)	10.78***	11.04***	11.38***	10.29**	2.150**	2.083**	1.626**	1.268
	(3.174)	(3.331)	(2.614)	(4.360)	(0.937)	(0.944)	(0.725)	(1.443)
MSCI/KLD Rated		-5.260				1.375		
		(6.039)				(0.892)		
CSR KLD			-28.81				-5.471	
			(45.45)				(5.961)	
MSCI score				0.0451				-0.0278
				(1.089)				(0.496)
Size	5.341**	5.341**	6.111	4.096	-0.580	-0.689	-0.560	-0.596
	(2.120)	(1.991)	(3.850)	(3.344)	(0.545)	(0.556)	(0.408)	(1.092)
Profitability	-18.78	-16.03	-60.09	28.25	-14.31***	-15.25***	1.814	-23.85
	(47.64)	(46.33)	(50.19)	(88.94)	(4.625)	(5.030)	(10.06)	(21.82)
Tangibility	-16.24	-18.39	-4.734	-0.158	-4.286	-3.643	-1.997	0.812
	(12.29)	(12.51)	(20.16)	(26.96)	(3.381)	(3.407)	(4.390)	(5.613)
MTB	-4.902	-4.461	-0.433	-7.809	-3.394***	-3.479***	-3.474***	-2.663**
	(3.054)	(3.209)	(3.451)	(5.902)	(0.902)	(0.874)	(0.969)	(1.140)
Cash to Assets	57.20**	57.74**	109.2***	7.455	16.79**	17.22**	8.622*	1.238
	(21.76)	(21.88)	(39.01)	(30.21)	(7.958)	(7.286)	(4.974)	(8.620)
Dividends to Assets	371.5***	347.4***	226.3*	164.1	-23.32	-20.66	-22.51	-24.41
	(130.7)	(123.4)	(121.2)	(166.4)	(16.06)	(16.76)	(21.41)	(20.07)
ROA	-188.1***	-197.6***	-171.7	-271.1***	-1.218	1.106	-22.39***	45.62
	(69.14)	(67.93)	(113.3)	(92.91)	(12.92)	(13.27)	(7.228)	(48.57)
Leverage	14.24	13.07	5.941	23.25	5.361*	5.270*	5.161	11.20
	(17.00)	(17.21)	(21.17)	(30.33)	(3.056)	(3.032)	(3.384)	(7.608)
Cash Flow to Assets	118.9	128.4*	194.7	219.7*	23.87**	21.75*	12.32	-27.65
	(74.36)	(74.93)	(139.1)	(112.9)	(10.52)	(10.94)	(9.929)	(26.04)
Innovation	-37.17**	-36.83**	-7.038	-38.32**	-6.339**	-5.972*	-1.002	-3.648
	(15.67)	(15.91)	(17.88)	(17.57)	(3.005)	(3.079)	(3.742)	(8.143)
Age	-1.599**	-1.592**	-0.938	-1.214	-0.125	-0.113	-0.270*	-0.0183
	(0.719)	(0.698)	(1.053)	(0.747)	(0.0941)	(0.0948)	(0.142)	(0.0982)
Debt Proceedings	-0.00476*	-0.00477*	0.00371	-0.000722				
	(0.00255)	(0.00257)	(0.00574)	(0.00476)				
Debt Maturity	-70.06***	-70.11***	-50.15	-42.56				
	(24.14)	(23.90)	(33.15)	(33.62)				
Coupon rate (%)	-3.079***	-3.077***	-3.332***	-3.233***				
	(0.640)	(0.640)	(1.049)	(0.718)				
YTM(%)	137.6***	137.5***	116.5***	106.3***				
	(26.49)	(26.31)	(37.48)	(37.42)				
Moodys Rating	-9.353***	-9.284***	-9.422***	-7.998***				
	(2.118)	(2.012)	(2.824)	(2.358)				
Industry and Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	2048	2048	1231	1182	1037	1037	615	411
R^2	0.887	0.888	0.870	0.874	0.173	0.175	0.217	0.464

Table 4: **Do Environmentally Penalized Firms Issue More Debt and/or Equity?**

This table presents estimates of the probability of issuance of debt and equity (SEO) using a matched sample of firms and a probit model. We match firms issuing debt or equity with no-issuing firms using the following firm characteristics: sales, leverage, book-to-market ratio, ROA, and industry SIC code. Table A1 shows descriptive statistics for the treated and control groups.

	Panel A: Debt Issuance				**Panel B: SEO**			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1(*Env. misconduct*)	0.228*	0.208*	0.126	0.106	0.506***	0.423***	0.291***	0.413***
	(0.117)	(0.113)	(0.135)	(0.219)	(0.0754)	(0.0741)	(0.0901)	(0.0992)
MSCI/KLD Rated		0.393***				0.412***		
		(0.0962)				(0.0704)		
KLD score			0.863				0.0155	
			(0.546)				(0.595)	
MSCI score				-0.0148				-0.0918**
				(0.0503)				(0.0372)
Marginal Effect (dy/dx)	8.95%**	8.8%*	4.72%	3.9%	19.64%***	16.14%***	10.86%***	15.1%***
Control Var.	YES	YES	YES	YES	YES	YES	YES	YES
Industry and Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Obs.	6788	6788	2121	1376	4082	4082	1967	1678
$Pseudo - R^2$	0.013	0.024	0.049	0.058	0.025	0.039	0.051	0.063

Table 5: **Heterogeneity: The Size of the Penalty Matters**

This table presents estimates of the impact of environmental violations on the cost of issuing debt and equity (SEO) on matched samples identified using the nearest-neighbor (NN) matching estimator. We match using the following firm characteristics: sales, leverage, book-to-market ratio, ROA, and industry SIC code. We split the sample according to the size of the penalty (above/below the median). In particular, we report estimates of specifications in columns (2) and (6) in Table 3 for debt and equity, respectively.

	Panel A: Debt (Spread, bp)		**Panel B: SEO (Issue Discount,%)**	
Penalty Size:	Small	Big	Small	Big
	(1)	(2)	(3)	(4)
$1(Env.\ misconduct)$	9.201**	13.16***	1.317	2.887*
	(3.670)	(4.178)	(1.320)	(1.463)
Control Var.	YES	YES	YES	YES
Industry and Year FE	YES	YES	YES	YES
Obs.	1032	1016	523	514
R^2	0.887	0.896	0.184	0.290

Table 6: **Heterogeneity: the Effect in Polluting vs Non-Polluting Industries**

This table presents estimates of the impact of environmental violations on the cost of issuing debt and equity (SEO) on matched samples identified using the nearest-neighbor (NN) matching estimator. We match using the following firm characteristics: sales, leverage, book-to-market ratio, ROA, and industry SIC code. We split the sample between polluting and non-polluting industries. Polluting firms are those in sectors defined by the two-digit SIC codes 10, 50, 33, 49, 28, 36, 12, 13, 20, 32, 30, 51, 26, 34, 29, 31, 35, 37, 24, and 27 (Berrone *et al.*, 2013). The remaining industries are classified as non-polluting. In particular, we report estimates of specifications in columns (2) and (6) in Table 3 for debt and equity, respectively.

	Panel A: Debt (Spread, bp)		**Panel B: SEO (Issue Discount,%)**	
	Polluting	Non-Polluting	Polluting	Non-Polluting
	(1)	(2)	(3)	(4)
$1(Env.\ misconduct)$	13.66***	5.033	2.248**	-0.437
	(4.415)	(3.830)	(1.042)	(2.137)
Control Var.	YES	YES	YES	YES
Industry and Year FE	YES	YES	YES	YES
Obs.	1420	628	961	70
R^2	0.898	0.871	0.170	0.758

Table 7: **Heterogeneity: the Role of Financial Constraints**

This table presents estimates of the impact of environmental violations on the cost of issuing debt and equity (SEO) on matched samples identified using the nearest-neighbor (NN) matching estimator. We match using the following firm characteristics: sales, leverage, book-to-market ratio, ROA, and industry SIC code. We split the sample between financially constrained and non-financially constrained firms. We define financially constrained firms (FC) as those with cash and cash flows below the median, respectively, or with a WW and KZ index above the median. In particular, we report estimates of specifications in columns (2) and (6) in Table 3 for debt and equity, respectively.

Panel A: Debt (Spread, bp)								
	Cash to Assets		Cash Flows to Assets		WW Index		KZ Index	
	Low	High	Low	High	FC	Non FC	FC	Non FC
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$1(Env.\ misconduct)$	10.49***	11.60**	8.723*	11.36***	6.855*	9.439**	9.485*	5.689
	(3.345)	(5.548)	(4.964)	(3.480)	(3.667)	(4.041)	(5.119)	(4.978)
Control Var.	YES	YES	YES	YES	YES	YES	YES	YES
Industry and Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Obs.	1024	1024	1028	1020	1012	1014	1008	1012
R^2	0.897	0.895	0.915	0.859	0.922	0.787	0.919	0.863
Panel B: SEO (Issue Discount,%)								
	Cash to Assets		Cash Flows to Assets		WW Index		KZ Index	
	Low	High	Low	High	FC	Non FC	FC	Non FC
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$1(Env.\ misconduct)$	2.205***	1.903	2.549	1.674	2.784	2.838***	-0.0783	2.912***
	(0.585)	(1.431)	(1.534)	(1.372)	(1.838)	(0.669)	(1.298)	(0.828)
Control Var.	YES	YES	YES	YES	YES	YES	YES	YES
Industry and Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Obs.	558	479	539	498	448	478	527	485
R^2	0.299	0.210	0.308	0.169	0.311	0.178	0.317	0.184

Table 8: **Heterogeneity: the Role of Information Asymmetries**

This table presents estimates of the impact of environmental violations on the cost of issuing debt and equity (SEO) on matched samples identified using the nearest-neighbor (NN) matching estimator. We match using the following firm characteristics: sales, leverage, book-to-market ratio, ROA, and industry SIC code. We split the sample between high and low levels of information asymmetries. We identify opaque (high information asymmetries) firms as young firms, those with low analyst coverage, and high bid-ask spread. In particular, we report estimates of specifications in columns (2) and (6) in Table 3 for debt and equity, respectively.

Panel A: Debt (Spread, bp)						
	Age		Analysts Coverage		Bid-Ask Spread	
	Young	Old	Low	High	Low	High
	(1)	(2)	(3)	(4)	(5)	(6)
$1(Env.\ misconduct)$	14.57***	3.748	12.11***	10.37**	6.485	12.38**
	(4.858)	(5.087)	(3.791)	(4.912)	(4.912)	(4.614)
Control Var.	YES	YES	YES	YES	YES	YES
Industry and Year FE	YES	YES	YES	YES	YES	YES
Obs.	1040	1008	1038	1000	1014	1016
R^2	0.884	0.907	0.903	0.877	0.868	0.899
Panel B: SEO (Issue Discount,%)						
	Age		Analysts Coverage		Bid-Ask Spread	
	Young	Old	Low	High	Low	High
	(1)	(2)	(3)	(4)	(5)	(6)
$1(Env.\ misconduct)$	3.040*	0.651	3.236***	0.481	0.0906	4.877**
	(1.664)	(0.844)	(0.961)	(0.791)	(0.314)	(1.762)
Control Var.	YES	YES	YES	YES	YES	YES
Industry and Year FE	YES	YES	YES	YES	YES	YES
Obs.	543	494	549	473	517	515
R^2	0.174	0.397	0.270	0.244	0.322	0.196

Table 9: **Heterogeneity: Investor Attention**

This table presents estimates of the impact of environmental violations on the cost of issuing debt and equity (SEO) on matched samples identified using the nearest-neighbor (NN) matching estimator. We match using the following firm characteristics: sales, leverage, book-to-market ratio, ROA, and industry SIC code. We split the sample between high and low levels of investor attention. We identify attentive investors using the annual trading volume of firm's stock and the average number of news within a year, this variable is called BUZZ and was obtained from *Thompson Reuters MarketPsych* database. In particular, we report estimates of specifications in columns (2) and (6) in Table 3 for debt and equity, respectively.

Panel A: Debt (Spread, bp)				
	Tranding Volume		Buzz	
	Low	High	Low	High
	(1)	(2)	(3)	(4)
$1(Env.\ misconduct)$	10.23***	8.151*	11.62***	7.810
	(3.404)	(4.694)	(4.150)	(5.113)
Control Var.	YES	YES	YES	YES
Industry and Year FE	YES	YES	YES	YES
Obs.	1016	1014	733	729
R^2	0.907	0.883	0.915	0.882
Panel B: SEO (Issue Discount,%)				
	Tranding Volume		Buzz	
	Low	High	Low	High
	(1)	(2)	(3)	(4)
$1(Env.\ misconduct)$	1.141	2.690**	1.806	2.096*
	(1.254)	(1.041)	(2.567)	(1.175)
Control Var.	YES	YES	YES	YES
Industry and Year FE	YES	YES	YES	YES
Obs.	524	512	286	268
R^2	0.258	0.214	0.338	0.236

Table A1: **Summary Statistics**

This table reports descriptive statistics for a matched sample of firms issuing bonds (or equity) and firms with no issuances in the same year and industry (2-digit SIC code). For debt issuances, we obtain 3,394 treated firms and an equal number of control firms; for equity issuances, we obtain 2,041 treated and 2,041 control firms, respectively. Panel A presents the summary statistics, median test, and Wilcoxon test for the variables used in matching. Panel B shows the summary statistics for the entire sample (treated and control firms). This sample is used in Table 4 of the main text.

Panel A: Matched Sample

	Bond Sample						SEO Sample					
	Treated		Control		Median	Wilcoxon	Treated		Control		Median	Wilcoxon
	Mean	Median	Mean	Median	Test	Test	Mean	Median	Mean	Median	Test	Test
Log(Sales)	5.516	5.130	5.549	5.176	0.344	0.557	9.132	9.129	9.080	9.082	0.531	0.472
Leverage	0.233	0.153	0.221	0.143	0.481	0.184	0.344	0.332	0.338	0.333	0.950	0.329
MTB	3.005	1.885	2.763	1.895	0.903	0.150	1.442	1.162	1.415	1.163	1.000	0.404
ROA	-0.328	-0.136	-0.277	-0.121	0.452	0.047	0.048	0.046	0.047	0.044	0.491	0.170

Panel B: Summary Statistics

	Bond Sample						SEO Sample					
	N	*Mean*	*Std*	P25	Median	P75	*N*	*Mean*	*Std*	P25	Median	P75
1(*Env. misconduct*)	6788	0.049	0.217	0	0	0	4082	0.215	0.411	0	0	0
MSCI/KLD Rated	6788	0.404	0.491	0	0	1	4082	0.634	0.482	0	1	1
Size	6788	5.533	2.118	4.012	5.156	6.974	4082	9.106	1.431	8.054	9.103	10.143
Profitability	6788	-0.223	0.503	-0.426	-0.059	0.103	4082	0.134	0.082	0.091	0.126	0.171
Tangibility	6788	0.224	0.264	0.032	0.1	0.334	4082	0.396	0.277	0.143	0.334	0.632
MTB	6788	2.884	3.399	1.03	1.89	3.461	4082	1.428	0.931	0.855	1.162	1.697
Cash to Assets	6788	0.413	0.348	0.06	0.352	0.758	4082	0.082	0.104	0.013	0.045	0.107
Dividends to Assets	6788	0.006	0.03	0	0	0	4082	0.02	0.027	0.001	0.013	0.027
ROA	6788	-0.302	0.555	-0.474	-0.127	0.027	4082	0.047	0.073	0.022	0.045	0.079
Leverage	6788	0.227	0.267	0	0.148	0.385	4082	0.341	0.167	0.222	0.333	0.437
Cash Flow to Assets	6788	-0.265	0.557	-0.446	-0.086	0.066	4082	0.091	0.071	0.058	0.087	0.123
Innovation	6788	0.123	0.19	0	0.021	0.181	4082	0.212	0.213	0.02	0.14	0.357
Age	6788	5.407	5.081	1	4	9	4082	8.394	5.702	3	8	13