

Toxic CEOs, ESG Funds as Watchdogs, and the Labor Market Outcomes

Finance Working Paper N° 871/2023
January 22, 2023

Ugur LeI
University of Georgia

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ECGI Working Paper Series in Finance

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Ugur Lel

University of Georgia and ECGI

Nalley Distinguished Chair In Finance, Associate Professor

University of Georgia

e-mail: ulel@uga.edu

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Ugur Lel*

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*Terry College of Business at the University of Georgia. I would like to thank Hieu Tran for research assistance, the editor, Camelia Kuhn, an associate editor, and two anonymous referees for their insightful comments and suggestions, and John Hund, Wei Jiang, Holger Mueller, and Malcolm Wardlaw for useful discussions, and seminar participants at the Fifth Edinburgh Corporate Finance Conference, Bilkent University, and the University of Georgia for helpful comments and suggestions. All errors are my sole responsibility.

1. Introduction

Corporate activities create significant negative environmental externalities. These economic costs can exceed \$4.7 trillion a year, are multi-sectoral, and appear through the entire lifecycle of products (Trucost, 2013).¹ Externalities of this scale pose a major risk to business viability and the global economy, yet, corporations have been hesitant to recognize and incorporate such risks into their policies.² Recently, several mechanisms have been proposed to address this market failure (e.g., enhanced ESG disclosure (Jouvenot and Kruger, 2021; Tomar, 2022), carbon pricing (Stavins, 2019; Green, 2021), SRIs (Pastor, Stambaugh, and Taylor, 2021; Kruger, Sautner, and Starks, 2020; Azar, Duro, Kadach, and Ormazabal, 2021), and ESG-conscious consumers (Nickerson, Lowe, Pattabhiramaiah, and Sorescu, 2022)). However, despite the increased attention about corporate sustainability policies, limited evidence exists about the role of CEO incentives in reducing environmental pollution. In this paper, I examine whether the labor market can prompt CEOs to internalize negative externalities from corporate environmental activities. This is an important question to address, because CEOs are key decision makers within firms (Waldman, Siegel, and Javidan, 2006), and the threat of holding them accountable for their actions can function as an important market-based deterrent to shape corporate environmental behavior.

Specifically, I examine changes in CEO labor market outcomes following corporate environmental misconduct, which creates negative externalities that firms are required by law to prevent. The fact that CEOs often sit on the boards of other firms allows me to analyze both the likelihood of their dismissal as CEOs and the change in the number of their external board memberships as outside directors. The latter effect, ex-post settling up in the labor market, is especially important in situations where the internal governance dynamics waver on punishing CEOs for failure.

¹ A 2010 United Nations study estimates that the world's largest 3,000 firms cause \$2.15 trillion worth of environmental damage every year, accounting for 7% of their revenues. Other involved parties including small and private companies contribute an additional \$4.45 trillion of environmental costs (UNEPFI, 2010).

² According to Pigou (1920), firms should not internalize negative environmental externalities. However, these externalities yet to be fully reflected in asset prices together with the regulatory risk in the transition to a low-carbon economy pose a long-term financial risk (Kruger et al. 2020; Bansal, Ochoa, and Kiku, 2017; Bolton and Kacperczyk, 2021; Hoepner, Oikonomou, Sautner, Starks, and Zhou, 2020; Seltzer, Starks, Zhu, 2020). The value at risk of manageable assets because of climate risk is estimated to be \$4.2 trillion (Economist Intelligence Unit, 2015). Further, climate change already shapes economic risks today through the increased frequency and severity of certain extreme weather events (e.g., Addoum, Ng, and Ortiz-Bobea, 2020). This warrants the integration of environmental issues into the long-term value maximization perspective.

I define environmental failure as a violation of environmental laws that eventually results in an enforcement action by the EPA. These enforcements are an ideal laboratory to analyze the labor market-based penalties of environmental misconduct on CEOs because they are clear violations of environmental laws, providing me with an accurate and objective assessment of corporate environmental activities. According to the EPA, they are the most serious environmental violations committed by firms. They cover a wide range of firms, thus, not subject to a media coverage bias, and they have been widely studied in different contexts (Heyes, 2000).

I focus on CEOs because they are in charge of formulating corporate strategy on environmental matters (e.g., Wernicke, Sajko, and Boone, 2022; Davidson, Dey, and Smith, 2019). They also make up a significant fraction of corporate boards (Fich, 2005).³ Prior evidence suggests that CEOs are rewarded with board seats in directorial labor markets due to their reputation, expertise, and performance (e.g., Fahlenbrach, Low, and Stulz, 2010). These directorships are valuable due to their monetary and non-monetary benefits such as prestige, visibility, and influence (Perry and Peyer, 2005; Yermack, 2004).

A priori, it is unclear that firms will discipline CEOs involved in EPA enforcements. The first view is that managers are punished for environmental wrongdoings due to SRI influence and reputational costs. The rise of SRIs, with about \$17.1 trillion of assets under management and a focus on ESG matters, has pushed firms to increasingly rely on non-financial ESG metrics in evaluating CEOs (e.g., Cohen, Kadach, Ormazabal, Reichelstein, 2022). Similarly, these investors can press firms for greater labor market penalties imposed on the offending CEOs, regardless of the impact on firm valuations.⁴ It is important to note that in such situations, the boards will be inclined to proactively penalize offending CEOs so as to receive SRIs' support in board elections and to protect their environmental reputation (Fama, 1980; Jiang, Wan, and Zhao, 2016; Dikolli, Frank, and Guo, 2022). Moreover, the revelation of environmental misconduct can result in substantial reputational costs to firms in the form of declines in share prices, profitability, and SRI exit (e.g., Klassen and McLaughlin,

³ About 43% of boards among the Russell 3000 firms include active and former top managers in their capacity as outside directors (see "Corporate Board Practices in the Russell 3000 and S&P 500: 2020," The Conference Board).

⁴ For example, in his 2018 letter to CEOs, BlackRock's CEO Larry Fink underlines the ability to manage environmental issues as a signal of CEOs' leadership skills (see <https://www.blackrock.com/corporate/investor-relations/larry-fink-ceo-letter>).

1996; Flammer, 2015; Kruger, 2015) as well as legal penalties levied by the EPA and courts (Karpoff, Lott, and Wehrly, 2005). As a backstop to these adverse effects, firms can dismiss offending CEOs (Bernile and Jarrell, 2009). Similar arguments apply to the external board seats of offending CEOs.

The second view is that CEOs of firms involved in environmental wrongdoings experience less adverse career prospects. Shareholders may penalize CEOs who implement environmentally friendly policies, such as environmental abatement measures that are effective at preventing EPA enforcements. This is because adopting environmentally friendly policies can be perceived as a way to extract private benefits by CEOs at the expense of shareholders, such as higher pay, masking poor firm performance, and improving their reputation as environmental leaders (e.g., Bebchuk and Tallarita, 2022; Dai, Gao, Lisic, and Zhang, 2021; Hubbard, Christensen, and Graffin, 2017). Further, CEOs can experience a greater demand for their services on other corporate boards due to the expertise gained through dealing with EPA's regulators. The third view is that environmental wrongdoings have no impact on CEOs' careers. Unless they harm profits, non-financial outcomes such as environmental violations may be irrelevant in evaluating CEOs and directors.⁵

In order to assess the impact of environmental misconduct on CEO labor market outcomes, I obtain data on historical civil, judicial, and administrative EPA enforcement cases from the Enforcement and Compliance History Online (ECHO) database. I measure the severity of corporate environmental violation by its occurrence and its magnitude measured by the dollar value of federal, state, and local penalties, and complying actions. About 4.4% of firms in the main sample is subject to EPA enforcements, with an average total cost of \$174,456 between 2002 and 2020.

I first evaluate if CEOs of firms that violate environmental laws are disciplined within their firms in the form of CEO dismissals. CEO turnover is shown to be an important disciplining mechanism following corporate failures (e.g., see Desai, Hogan, and Wilkins (2006) for earnings restatements; Karpoff, Lee, and Martin (2008) for financial misconduct; Efendi, Files, Ouyang, and

⁵ Firms can encourage CEOs to violate environmental laws to the extent the immediate benefits from violations exceed the regulatory and reputational penalties in the short run, or when firms perceive a low probability of being caught by regulators (Atkinson, 2023). At the same time, prior studies suggest that environmentally friendly activities can benefit shareholders by reducing firms' risks (e.g., Albuquerque, Durnev, and Koskinen, 2019; Hoepner et al. 2020), improving profitability and returns (Eccles, Ioannou, and Serafeim, 2014; Dimson, Karakas, and Li, 2015), and increasing customer loyalty (Servaes and Tamayo, 2013).

Swanson (2013) for the option backdating scandal). I find that such CEOs face a greater likelihood of dismissal from their firms. This effect is both statistically and economically significant. The offending CEOs face a 1.9 percentage point higher probability of dismissal, and this corresponds to a 21.8% increase in CEO turnover on average. This higher CEO dismissal propensity reveals significant penalties for managers of firms engaged in environmental misconduct.

Next, I test the disciplinary effects of environmental misconduct in directorial labor markets in the form of the number of external board seats served. The ex-post settling hypothesis of Fama (1980) and Fama and Jensen (1983) suggests that penalties are imposed by the labor market on directors for corporate wrongdoings. Studies scrutinizing corporate misbehavior such as the option backdating scandal, fraudulent activities, and earnings restatements document that directors are punished with fewer external board memberships (e.g., Ertimur, Ferri, and Maber, 2012; Fich and Shivdasani, 2007; Srinivasan, 2005). I find a significant decline in the number of external boards served on by CEOs following environmental misconduct. CEOs lose on average 3.42% of board seats held and this effect accumulates to 7.69% within three years of EPA enforcements. These results suggest that CEOs face further discipline from the directorial labor market in terms of the number of external boards they sit on following the revelation of EPA enforcements. While the economic effects of environmental violations on both CEO turnover and the number of external board seats are lower than what is observed in other types of misconduct, they remain significant and highlight the unique impact of environmental violations on executive career paths.

Examining the timing of these penalties on CEOs, I find that most of the changes in dismissal rates and external board memberships occur after 2010. This is a period marked by the BP oil spill disaster in 2010, the Volkswagen emission test scandal in 2015, the rapid rise of SRIs, and intensified media coverage of environmental issues. The time-varying aspect of these effects is also consistent with the increase in the negative stock market reaction to eco-harmful behavior documented by Flammer (2015). I also find that CEOs that are dismissed following an EPA enforcement are less likely to get another CEO position in a listed firm within three years of dismissal compared to CEOs dismissed for other reasons.

I subject the aforementioned results to a variety of robustness checks including a matched sample analysis using entropy balancing, significant increases in state EPA budgets as a semi-exogenous source of variation in EPA enforcements, controlling for managerial ability and short-termism, exclusion of industries with most and least frequent EPA violations, and an alternative sample that only includes firms subject to an EPA enforcement during the sample period. Results remain robust to these alternative considerations. I also augment the empirical specification throughout the analysis with fixed effects at the firm, state x year, and industry x year levels. The purpose of these fixed effects is to eliminate sources of variation in the main outcome variables other than the EPA enforcement, such as unobserved firm-level heterogeneity, time-varying state-level and industry-level differences in EPA enforcement and regulations.

After documenting the labor market consequences of EPA enforcements to CEOs, I explore two channels through which these effects can occur; shareholder voice and SRIs. The ability of shareholders to replace ineffective directors ensures the proper functioning of the board of directors. Previous research shows that shareholders use votes in director elections to voice their dissatisfaction with directors' performance (e.g., Cai, Garner, and Walkling, 2009; Aggarwal, Dahiya, and Prabhala, 2019). Further, directors of firms involved in the option backdating scandal and financial fraud are penalized in terms of votes withheld (e.g., Ertimur et al. 2012; Brochet and Srinivasan, 2014). In light of these arguments, I test if shareholder voting support is one potential channel thru which CEOs of offending firms are penalized in their external board directorships. I observe significant shareholder dissent in elections of offending CEOs on other boards following EPA enforcements. Following the revelation of the EPA enforcement, shareholder dissent in elections of offending CEOs increases by 1.3 percentage points, which corresponds to a 26.5% increase on average. A nice feature of analyzing director elections is that they constitute an alternative measure of reputational damage. Shareholder dissatisfaction with directors can be observed from the voting patterns even in absence of a director turnover.

Second, I examine SRIs as another channel through which CEOs of firms involved in EPA enforcements can be penalized. These institutional investors explicitly link their investment policies to ESG issues. Studies show that they improve firms' ESG ratings (e.g., Dyck, Lins, Roth, and Wagner,

2019; Kim, Wan, Wang, and Yang, 2019), engage privately with their portfolio firms (Kruger et al. 2020; Dimson et al. 2015) and publicly through voting on environmental and social shareholder proposals (Dikolli et al. 2022).⁶ Thus, I conjecture that if SRIs pay attention to environmental matters, their presence should amplify external and internal labor market penalties documented in earlier tests. I find that the number of external directorships of involved CEOs decreases by 6.44% in the year following EPA enforcements for a firm in the top quartile of SRI ownership compared to the one in the bottom quartile of SRI ownership. The likelihood of CEO dismissal and shareholder opposition in director elections are also significantly amplified when SRIs hold a greater share of the firm's equity. These results suggest that SRIs put pressure on CEOs of violating firms following EPA enforcement actions both internally within the firm and externally in the labor market for directorships.

A pertinent question is whether the impact of environmental violations on labor market outcomes depends on the underlying reasons for shareholder reaction. The aversion of shareholders to environmental violations could stem from the associated potential liabilities, the gravity of legal fines, and the negative spotlight from media reports. I use the nature of environmental violation as an indicator for assessing potential future liability risks given that changes in environmental liabilities arising from either CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) or RCRA (Resource Conservation and Recovery Act) can have important consequences on firms' behavior and their environmental compliance (Akey and Appel, 2021; Bellon, 2023; Ohlrogge 2020; Chen et al. 2022). I find that CEOs face more severe consequences for violations under CERCLA and RCRA, reflecting shareholder concern over future liability risks in their decisions to hold CEOs accountable. On the other hand, shareholders seem less concerned about the impact of environmental violations because of legal fines and media backlash.

The results are robust to alternative measures of EPA enforcement intensity such as the number of EPA cases and the magnitude of the penalty and mitigation costs that firms incur. However, the associated economic effects are smaller. This is in part because monetary penalties imposed on firms for violating environmental law are too small compared to firm size to matter, as

⁶ Several studies show that SRIs are involved in greenwashing, that is, they fall short on their promise of integrating ESG goals to their investment decisions (e.g., Heath, Macciocchi, Michaely, and Ringgenberg, 2022; Kim and Yoon, 2021).

argued by several legal scholars (e.g., Stefanutti, 2022), and suggests that the occurrence of the EPA violation is more important than the legal fines incurred by the firm.

The remainder of the paper is organized as follows. The next section provides an overview of the related literature. Section 3 provides background information on EPA enforcement mechanisms and Section 4 describes the data and the sample. Section 5 reports the baseline results on the consequences of EPA enforcements to CEOs. Section 6 analyzes the role of shareholder support and SRI ownership and Section 7 explores the reasons underlying the shareholder reaction to environmental violations. Section 8 concludes.

2. Related Literature

This study contributes to several strands of research. First, it adds to the rapidly growing literature on SRIs. These investors can improve firms' ESG ratings and engage with their portfolio firms (Dyck et al. 2019; Kruger et al. 2020; Dimson et al. 2021; Dikolli et al. 2022). I identify a specific engagement channel of SRIs with firms on environmental matters initiated by the EPA enforcement. Results show that one way for SRIs to influence firm environmental behavior is through their disciplining of CEOs and directors involved in environmental misconduct. This is consistent with SRIs' preference on engaging in dialogue with portfolio companies over the threat of exit to influence corporate environmental behavior (Kruger et al. 2020; Broccardo, Hart, and Zingales, 2022). Further, whether SRIs' investment activities are aligned with the stated goal of sustainability is currently under debate (e.g., Brandon, Glossner, Kruger, Matos, and Steffen, 2021; Kim and Yoon, 2021). The involvement of SRIs in punishing the offending CEOs such as voting against their elections on boards of other firms provides an important perspective to this debate.

Second, it is related to the extensive literature studying the consequences of corporate misconduct. CEOs and directors of firms involved in misbehavior such as earnings restatements (Desai et al. 2006; Srinivasan, 2005; Hazarika, Karpoff, and Nahata, 2012), fraudulent activities (e.g., Karpoff et al. 2008; Fich and Shivdasani, 2007), and option backdating (Efendi et al. 2013; Ertimur et al. 2012) are shown to be punished by shareholders in the labor market. However, despite

environmental violations' significant impact on the environment, human health, and property, research on the ramifications for the CEO labor market prospects remains scarce.

This gap is striking considering the unique nature of environmental violations compared to other forms of corporate misconduct in several important ways. First, unlike the aforementioned examples of corporate misconduct, environmental offenses burden parties beyond those doing business with the polluting company. Consequently, there is generally no direct contractual relationship with the defendants in environmental misconduct cases. Further, in contrast to other forms of corporate misconduct, environmental violations have a direct impact on the environment and human health. Second, it is not clear that stakeholders are protected against corporate wrongdoings as well as shareholders by the legal system (Admati and Buchak, 2022). This may suggest that the system might not react as vehemently to environmental violations, despite their significant detrimental impact on the environment and human health, if these violations do not equally harm shareholders. As a result, managers and directors may face less frequent personal liability for environmental misconduct, which diminishes their motivation for compliance. However, shareholders can exert influence on CEOs through the labor market to enforce accountability and enhance the deterrent effect of environmental violations. In addition, addressing environmental externalities arising from corporate activities has emerged as a priority for some shareholders (e.g., SRIs). In this aspect, two closely related papers are Aharony, Liu and Yawson (2015) and Liu, Aharony, Richardson, and Yawson (2016), which use private litigation cases on antitrust, contractual, environmental, and intellectual property topics from 2000 to 2007, and find that CEO turnover does not increase, and no changes in external directorships occur following environmental lawsuits, respectively.⁷

Furthermore, the results show that CEOs are primarily penalized for environmental violations pertaining to CERCLA and RCRA, highlighting shareholder concerns over future liability risks from

⁷ My results are very different from these two studies, likely due to the measurement of corporate environmental wrongdoing and the sample period. I examine public enforcements that are based on the explicit violation of environmental laws rather than private litigation, some of which can be frivolous. This reduces the concern about the mismeasurement of environmental wrongdoings. Further, I study a substantially longer sample period of 2001 to 2020. The effects I document are mostly noticeable in the later part of my sample period that witnessed the rise of SRIs, and for firms with high SRI ownership. Finally, the scope of the analysis is different. I examine not only CEO dismissal and changes in CEOs' external board memberships but the channels through which changes in CEOs' careers can occur, namely shareholder voting and SRI ownership, while exploiting the staggered adoption of state regulations on environment as an exogenous shock to the intensity of public enforcements.

such violations leading to disciplining actions against CEOs. This finding is novel in the context of CEO labor markets and aligns with Bellon (2022), who documents that private equity-backed firms reduce pollution when their portfolio companies operate in places with high liability risks.

The third strand of research this paper contributes to is the mechanisms that direct firms to internalize the costs of, and financial risks from, corporate environmental harm. Several potential mechanisms have been studied in the literature such as enhanced ESG disclosure (e.g., Tomar, 2022), SRIs (e.g., Kruger et al. 2020), and consumers (e.g., Nickerson et al. 2022). The findings of this study imply that holding CEOs responsible for environmental violations can be an effective way to reduce negative externalities from corporate environmental activities.

This study has important policy implications. The finding that EPA enforcements affect CEOs' careers mostly in firms with SRIs points to a bright side of SRIs, that market-based solutions can supplement regulatory actions to encourage more environment friendly corporate behavior. Further, my results imply that the labor market for environmental reputation can be an important mechanism to internalize negative externalities from corporate environmental activities. Without an adverse consequence of environmental failures to key corporate decision makers, similar corporate actions are likely to be repeated. Another policy implication is that CEOs might not fully grasp the job-market risks tied to environmental misconduct. Enhancing CEO awareness of these risks can incentivize them to prioritize their firms' environmental performance, benefiting both their career progression and corporate environmental responsibility. Finally, this paper also contributes to the public enforcement literature by showing enforcement of environmental law has repercussions for CEOs' career aspects (e.g., Karpoff et al. 2005; Jackson and Roe, 2009; Hutton, Shu, and Zheng, 2022).

3. Background on EPA Enforcements

Environmental Protection Agency is created in 1970 to consolidate environmental responsibilities of the federal government under one agency. The two most important laws governing EPA are Clean Air Act of 1970 and Clean Water Act of 1972, both passed in well-publicized and

bipartisan bills.⁸ The Clean Air Act of 1970 directs EPA to set standards for the kinds of toxic air pollutants that can be released into the ambient air. The Clean Water Act of 1972 directs EPA to set standards for the kinds of pollutants that can be released into lakes, streams, and rivers, and it forces polluters to get permits to do so. The acts governing environmental law and policy define a specific form of Congressional power that is delegated to EPA. This power is used by EPA to formulate rules, which carry the force of law, and establish a floor for how strictly a pollutant may be regulated. The states can set stricter rules, and the federal and state environmental agencies have overlapping responsibilities regarding enforcement of environmental laws.⁹

A central part of EPA's goal to protect human health and the environment is achieved by enforcing environmental laws.¹⁰ When warranted, EPA takes civil or criminal enforcement actions against violators of environmental laws. There are three types of enforcement actions that EPA can take. Civil administrative actions are non-judicial enforcement actions taken by EPA or a state regulator under its own authority.¹¹ These actions do not involve a judicial court process, and may be in the form of a notice of violation or a superfund notice letter, or an order (either with or without penalties) directing an individual or a business entity to take action to come into compliance. Civil judicial actions are formal lawsuits. They are filed in court, against individuals or entities that have failed to comply with statutory or regulatory requirements, comply with an administrative order, pay EPA the costs for cleaning up a superfund site, or commit to doing the cleanup work. These cases are filed by the U.S. Department of Justice on behalf of EPA. In civil cases, they are typically filed by the state's attorney general on behalf of the state. Criminal actions can occur when EPA or a state enforces against a company or person through a criminal action. Criminal actions are usually reserved for the

⁸ Other prominent pieces of legislation passed by the Congress on governing environmental law and policy are Toxic Substances Control Act, Comprehensive Environmental Response, Compensation, and Liability Act, Endangered Species Act, Marine Protection, Research and Sanctuaries Act, National Environmental Policy Act, and Resource Conservation and Recovery Act.

⁹ An exception is issued to California. California can set tighter standards than the EPA on the Clean Air Act's rules on car tailpipe emissions, and other states can opt into California's stricter rules.

¹⁰ Evidence suggests that enforcement of environmental laws significantly increases compliance, resulting in improvements in environmental quality (Gray and Shimshack, 2020).

¹¹ States have been given implementation authority for all or most of the major enforcement areas of air, water and hazardous waste, but the EPA and its regional offices can bring enforcement actions themselves. While the EPA complains that states' efforts are either inconsistent or not too strict, the states complain that EPA's policies are too rigid or lax, depending on the state.

most serious violations that are knowingly committed. In these cases, a court conviction can result in fines or imprisonment.

Enforcement results depend on the type of the enforcement. A civil enforcement can result in one of the following three outcomes. First, settlements, which are agreed-upon resolutions to an enforcement case (e.g., install pollution control equipment), are either in the form of consent agreements/final orders or administrative orders on consent in the case of administrative actions, or in the form of consent decrees signed by all parties to the action and filed in the appropriate court in the case of judicial actions. Second, civil penalties involve monetary assessments due to a violation or noncompliance with the environmental statutes and regulations. Finally, supplemental environmental projects (SEPs) and complying actions can also be part of an enforcement settlement. Most federal actions for failure to comply with the environmental laws are resolved through settlement agreements. As part of a settlement, the violator can voluntarily agree to perform an environmental improvement project to mitigate part of a civil penalty assessed by EPA. These projects are in addition to actions required to correct the violations specified in the settlement. On the other hand, a criminal enforcement can involve either monetary fine, restitution, or incarceration.

4. Data and Sample Construction

I obtain data on civil, judicial, and administrative federal EPA enforcement cases from EPA's enforcement division.¹² The ECHO database reports data on the inspection, violation, and enforcement for the Clean Air Act (CAA), Clean Water Act (CWA), Resource Conservation and Recovery Act (RCRA), and also includes Safe Drinking Water Act (SDWA) and Toxics Release Inventory (TRI) data. This dataset provides information on the violator such as its name, location, the date when the enforcement case is filed against the company, the final conclusion date, the violation type as well as the penalties, compliance, and mitigation costs at the facility level.¹³ I aggregate all

¹² The enforcement data at the facility level are accessible at <https://echo.epa.gov>. The historical enforcement actions are provided in the EPA's Integrated Compliance Information System (ICIS) within ECHO.

¹³ While the type of violation is also available in the EPA database, this information is not feasible to use in my setting because I aggregate the enforcements at the parent firm level, and parent firms can have multiple violations in the same year.

enforcement actions at the parent company level by using the EPA's link file between facilities and their parent companies, and then match them with Compustat and Refinitiv to create the final regression sample.

EPA pursues civil and criminal cases against violators of environmental laws and focuses its enforcement and compliance resources on the most serious environmental violations. Figure 1a shows a decline in the number of environmental civil cases, and no substantial change in the number of criminal cases. Figure 1b reports the breakdown of the value of EPA enforcement actions over time. Civil and criminal penalties are significant in certain years. The geographical distribution of the enforcement cases is widespread. Figure 2 shows that the enforcements do not cluster in several states.¹⁴

I use EPA enforcements to proxy for environmental failures for several reasons. They allow me to objectively and accurately assess whether a firm engages in environmental misconduct. They are significant cases of environmental law violations that have been widely studied in different contexts, and they cover a wide range of firms.¹⁵ Such a significant revelation of an environmental failure is central toward identifying the labor market-based penalties of environmental wrongdoings.¹⁶

I use three variables to proxy for EPA enforcement activities. The first variable measures the presence of an EPA enforcement against the firm in a given year, *Enforce Dummy*. I also use two variables to proxy for the intensity of EPA enforcements. The second variable is *Enforce Case*, the annual number of EPA enforcements a firm is subject to. This is a continuous version of the discrete variable. Finally, *Enforce Penalty* is the dollar amount of the sum of civil and criminal penalties imposed on the firm by the EPA enforcement case per year. I aggregate federal, state, and local penalties, and scale them by total assets. I also employ *Enforce Total* as a robustness check, which includes both

¹⁴ EPA works to ensure compliance with environmental requirements. It conducts both onsite and offsite (e.g., aerial photography) inspections of facilities to assess compliance with environmental requirements. Inspections tend to focus on facilities likely to be violating EPA laws due to limited budget and time. EPA enforcement is not perfect, as the true noncompliance rates are estimated to be higher than what EPA resources can allow (Giles, 2022).

¹⁵ These studies include Chang, Fu, Li, Tam, and Wong (2021), Dasgupta, Huynh and Xia (2021), Duchin, Gao, and Xu (2022), Heitz, Wang, and Wang (2021), Heyes (2000), Hsu, Li, and Tsou (2023), Shive and Forster (2020), Xu and Kim (2022).

¹⁶ An alternative method to identify environmental misconduct is to focus on firms with low ratings on the E component of ESG ratings. However, these ratings are criticized in recent studies because they can mismeasure the true extent of corporate ESG activities (Kruger, 2015), and they can diverge significantly across various vendors (Berg et al. 2022). Another alternative is to use news coverage of corporate environmental actions. However, news coverage tends to focus on large firms and newsworthy events, and leads to a subjective determination of the nature and severity of corporate environmental unfriendliness as well as the scope of what counts as a corporate environmental activity.

penalties and other costs (SEPs and complying actions) incurred by the firm and report the results in Table IA.17. Following Shive and Forster (2020), I use the first date that the case is reported in ECHO, the filing date, to assign a year to the violation.

Table 1 Panel A shows that enforcement actions are rare. Only 4.4% of firms are subject to EPA enforcements in the sample. The average firm has 0.128 number of EPA enforcements and pays \$174,456 in total costs to satisfy the EPA requirements. The size of monetary penalties imposed by EPA for environmental misconduct is criticized as immaterial to large firms (e.g., Stefanutti, 2022). The average number of external board directorships is 1.196 as reported in Panel A, which is in line with the average number of directorships reported in some prior studies such as 1.19 in Brochet and Srinivasan (2014) and 1.28 in Srinivasan (2005). The average CEO turnover rate is 0.087, which is slightly lower than 10.8% reported in Jenter and Kanaan (2015). Panel B provides an industry breakdown of EPA enforcement activity at the one-digit SIC code level, and Panel C presents changes in EPA enforcement intensity over time. The top three industries targeted by EPA enforcements are utility (11.3%), mining (7.9%), and manufacturing (6.7%).

5. Results

This goal of this paper is to examine the labor market consequences to CEOs of environmental misconduct. To this end, I study two main career outcomes: the consequences to CEOs inside the firm—the probability of CEO dismissal, and outside the firm—the number of external board seats that CEOs sit on.

The empirical specification used to test these outcomes includes firm fixed effects to control for the impact of time-invariant firm-specific determinants of CEO employment opportunities such as the firm's prestige and governance environment. State x year fixed effects are included to control for any state-specific characteristic such as firm location, changes in state regulations, economic activity, political environment, and enforcement intensity. Industry x year fixed effects capture industry growth options, industry trends in governance mechanisms, and enforcement intensity. Finally, year fixed effects are included to control for general time trends in the dependent variable and EPA enforcement intensity such as the EPA budget. The regression specification also includes control

variables commonly used in the labor market literature (e.g., Yermack, 2004; Fich and Shivdasani, 2007; Del Guercio et al. 2008; Ertimur et al. 2012).¹⁷ I winsorize all continuous variables at the one percent level and use one-year lagged values of time-varying independent variables. Robust standard errors are estimated by double clustering at the state and year levels.

5.1. CEO Dismissals and EPA Enforcements

I first examine whether EPA enforcement intensity affects the propensity to dismiss CEOs. The first three columns of Table 2 report results from testing this hypothesis. The dependent variable in these columns takes on the value of 1 in the year a CEO is dismissed, 0 otherwise. The main variables of interest are the three measures EPA enforcement activity. All columns use the same empirical specification except for the EPA enforcement activity measure. The regression sample encompasses all U.S. firm-year observations from BoardEX with an identifiable CEO from 2002 to 2020.

Table 2 shows that CEOs are more likely to lose their jobs subsequent to the EPA enforcement action against the firm. Across all three columns, I observe a positive coefficient estimate on the EPA enforcement measures. For example, column (1) of Table 2 uses *Enforce Dummy*, an indicator variable to denote the occurrence of an EPA enforcement against the firm in the current year. It shows a statistically significant coefficient estimate of 0.019 (t-stats = 2.770). Compared to the unconditional mean of 0.087, this coefficient estimate implies a 21.8% increase in the probability of CEO dismissal following an EPA enforcement action. This effect is slightly lower than that in several other misconduct types but still economically significant.¹⁸ Further, column (2) reports a coefficient estimate of 0.009 (t-stats = 3.223) for the number of EPA enforcement cases against the firm. Column (3) that uses the ratio of EPA penalties to firm assets, and also reports a statistically significant

¹⁷ These are the natural logarithm of total assets, the ratio of EBIT to total assets (e.g., Weisbach, 1988), z score, total institutional and inside ownership percentages (e.g., Huson, Parrino, and Starks, 2001), % of outside directors (e.g., Fich and Shivdasani, 2007), in addition to CEO characteristics, namely, the natural logarithm of CEO's age and tenure with the firm, gender, and the number of managerial awards. Definitions of these variables are reported in Table 1 in the appendix.

¹⁸ Several studies underscore the diverse impacts of corporate misconduct on executive turnover. For example, Desai et al. (2006) highlight a 28% higher likelihood of CEO replacement after earnings restatements and Efendi et al. (2013) note a 1.6 times higher probability of CEO/CFO turnover following option backdating. In addition, Cline, Walkling, and Yore (2018) find CEOs involved in indiscretions face a 41.3% increased risk of dismissal and Karpoff et al. (2008) report that 20.2% of CEOs implicated in financial misrepresentation lose their positions.

coefficient estimate (0.002, $t = 2.897$). The economic magnitude of the change in the CEO turnover propensity is lower when I use a continuous measure of EPA enforcement intensity compared to the discrete measure. This suggests that the occurrence of the EPA enforcement is likely more important than the associated legal fines incurred by the firm. It is also likely that the presence of an EPA enforcement is enough for environmental activist shareholders such as SRIs to act upon. These three columns altogether point to a disciplinary effect following EPA enforcements.

5.2. External Directorships and EPA Enforcements

Next, I test the ex-post settling hypothesis of Fama (1980) and Fama and Jensen (1983) in the context of environmental misconduct. The last three columns of Table 2 report results from this regression specification where I use the number of external board memberships CEOs serve on as the dependent variable. To avoid double-counting the own-firm effects, I exclude the board seat held by the CEO in the firm subject to the EPA enforcement.¹⁹

Table 2 shows that CEOs hold fewer external board seats following EPA enforcements. Column (4) reports a negative and statistically significant coefficient estimate of -0.041 (t -stats = -2.553) on *Enforce Dummy*, suggesting that CEOs on average hold 3.42% fewer external board directorships in the years following EPA enforcements. This magnitude is smaller than that observed for CEO dismissal, partly because some firms have staggered boards and thus it can take multiple years for the shareholders to be able to replace the director, as I show in the next subsection. This reduction in external board seats is modest compared to other corporate misconduct studies, highlighting the variation in economic effects based on the misconduct type.²⁰ The next two columns use the alternative measures of EPA enforcement activity and show statistically significant declines in the total number of external directorships following an EPA enforcement.²¹ For example, column (5)

¹⁹ Including such board seats does not alter the results with the exception that the economic effects become stronger.

²⁰ For example, Ertimur, Ferri, and Maber (2012) report a 0.21 seat decrease for directors at firms implicated in option back-dating and Fich and Shivdasani (2007) report a 0.48 seat loss for directors at lawsuit-facing firms while Srinivasan (2005) notes a 0.31 seat drop post-accounting restatements. CEOs' board seat losses, as reported in Table IA.5, reach 7.69% (or 0.092 board seats) within three years post-environmental violation, considering staggered board effects.

²¹ I do not use a non-linear estimation in Table 2 because (1) non-linear specifications suffer from the incidental parameters problem when the specification includes a large number of fixed effects (Greene, 2004) and (2) OLS estimates are still accurate in such cases where the dependent variable is a count variable (Angrist and Pischke, 2009). The results in Table

reports a coefficient estimate of -0.028 (t-stats = -3.104) for the number of EPA enforcements, which implies a 1.62% standard deviation decrease in the total number of external board directorships for the offending firm's CEO for one standard deviation increase in the number of enforcements. Overall, Table 2 collectively points to a significant reputational damage to CEOs from environmental violations. Not only that the offending CEOs are more likely to be dismissed as the CEO but experience fewer external board directorships subsequent to EPA enforcements.

5.3. Additional Tests

While Table 2 shows that CEOs face adverse labor market outcomes following EPA enforcements, an alternative explanation could be that inferior managerial skills that are correlated with more environmental violations drive these results. In other words, changes in CEOs' labor market outcomes could occur because less competent CEOs are more prone to committing such violations. To explore this hypothesis, I re-estimate Table 2 after including a measure of managerial ability utilized by Demerjian, Lev, and McVay (2012) in the regression specification.²² Table IA.2 shows that previously documented results are robust to controlling for managerial ability.²³

A related concern is that the results in Table 2 could stem from managerial short-termism, defined as managerial incentives to amplify short-term profits at the expense of long-term performance. CEOs adhering to such incentives may slash environmental expenditures to temporarily boost profits, and thus, changes in CEO labor market outcomes can be indicative of such incentives. Existing literature shows that short-termism can harm corporate ESG profiles and valuations (Glossner, 2019; Lin, Wei, Yang, and Zhang, 2021; Flammer and Bansal, 2017). In light of this, I test whether greater short-termism is related to more environmental violations and whether the labor market outcomes are associated with short-termism. I employ two variables to proxy for the degree of managerial short-termism: institutional ownership by short-term investors (e.g., Bushee, 2001),

2 regarding the number of external board seats are robust to a Poisson estimation as reported in Table IA.1 in the internet appendix.

²² The sample size is smaller in this analysis due to data unavailability from Demerjian et al. (2012), who calculate this variable from partitioning total firm efficiency, defined as the ability to generate more revenues from a given set of inputs, between the firm and the manager.

²³ One concern is that shareholders could learn about the CEO's skills when environmental violations happen. However, the correlation between measures of managerial ability and environmental violations is low.

defined as ownership by transient investors, and long-term incentive-based compensation (e.g., Kim and Kim, 2023), calculated as the sum of restricted stock awards and option awards divided by total compensation. Table IA.3 shows that managerial short-termism is not related to environmental violations, and the previously documented results are mostly robust to controlling for managerial short-termism.²⁴

I next examine the dynamic effects of EPA enforcements on CEOs for two reasons. First, in case of classified boards, the previous tests can underestimate the true effect of environmental failures in labor markets. It may also take longer than one year for shareholders to coordinate for enough support for CEO and director removals. Second, such an analysis can show if the environmental failures have lasting effects. Table IA.5 shows that the effects of environmental misconduct on CEO dismissal propensities and external board memberships last for up to two years. For example, column (4) reports negative and statistically significant coefficient estimates for two years, and the overall economic impact of environmental violations increases to 7.69% within three years. Thus, the one-year estimates reported in Table 2 severely underestimate the true economic effect of environmental misconduct. Figure 3 presents the notable shift in the probability of CEO dismissal and the number of external board seats within three years around environmental violations.

5.4. Labor Market Consequences of EPA Enforcements over Time

While the regression sample includes the period from 2002 through 2020, the changes in CEO labor market outcomes I document earlier may vary over time because this period coincides with several major environmental events such as the BP oil spill disaster in 2010, the Volkswagen emission test scandal in 2015, a rapid rise of SRI equity ownership since early 2010s, and subsequently an intensified media coverage of environmental issues. Thus, following Dyck et al. (2019), I examine if changes in CEO labor market outcomes differ after the BP oil spill in 2010. I achieve this by dividing the EPA intensity measures into two components, one for the subperiod between 2002 and 2009 and

²⁴ Recognizing the intricate relationship between investors' ESG preferences and their investment horizons, I also employ SRI ownership as an alternative measure of short-termism and report the results in Table IA.4. This table reveals that a higher concentration of long-term ESG-focused investors exhibit a reduced propensity for environmental violations, thereby providing a more nuanced understanding of the impact of investor behavior. However, this effect is not robustly significant across the three measures of environmental violation.

one for the subperiod between 2010 and 2020, and then test whether the EPA intensity coefficient estimates are same across the two subperiods.

Table 3 shows that the significant changes in the CEO dismissal rates and external board memberships of offending CEOs occur primarily after 2010. For example, focusing on the enforcement dummy as the measure of EPA enforcement intensity, I find that the coefficient estimate on the time period between 2002 and 2009 is 0.002 (t-stats = 0.182), and the one on the later time period is 0.031 (t-stats = 5.324) as shown in column (1). The bottom row of this table shows that the two coefficient estimates are statistically different (p-value = 0.002). Similarly, column (4) reports a statistically significant coefficient estimate only for the latter time period (-0.075 with a t-stats of -3.319), and the coefficient estimates are statistically different between the two time periods ($p = 0.027$). The economic effects are also much larger in the second half of the sample period and larger than the average economic effects documented in Table 2. The timing of these effects is consistent with an increased attention to environmental concerns with the BP oil spill disaster and with the rise of SRIs as well as an increase in the negative stock market reaction to eco-harmful behavior documented by Flammer (2015). A caveat with this analysis is that results from the latter half of the sample period may be contaminated by subsequent developments. A more detailed analysis of the changes in labor market outcomes following environmental violations around the BP oil spill is reported in section 5.6.

5.5. Matched Sample Analysis

One potential concern with the results in Table 2 is that they could be driven by observable differences between firms subject to EPA enforcements and those that are not. Thus, I replicate the analysis in Table 2 after creating a matched sample using the entropy balancing approach where I reweight the control observations such that the mean and standard deviation of firm performance, firm size, total institutional and inside ownership, leverage ratio, outside director %, CEO age and the number of awards are highly similar between the two groups of firms. Unlike other matching methods, the entropy balancing method does not require subjective design choices and allows for a larger sample to be retained in the matched sample analysis (Hainmueller, 2012). Table IA.6 shows no statistically significant differences between firm-year observations subject to EPA enforcements and those that are not after entropy balancing.

Table 4 presents the results from this matched sample analysis. Consistent with the baseline analysis, I note that the coefficients on the EPA enforcement intensity measures are statistically significant across all columns, suggesting that CEOs are more likely to be dismissed and also experience a decline in their external board directorships following EPA enforcements. The economic effects of changes in labor market outcomes increase, as shown by the larger magnitudes on the coefficients. For example, column (1) reports a coefficient estimate of 0.037 compared to 0.019 in Table 2. Overall, the matched sample along with the various fixed effects suggests that observable differences between the EPA and non-EPA observations do not drive the results. However, a remaining concern is that my findings could be driven by omitted unobservable factors not controlled for in the empirical specification. To address this concern, I augment the analysis with an identification test as detailed below.

5.6. State-Level Variation in Enforcement, BP Oil Spill, and Labor Market Outcomes

Endogeneity can arise in my setting because the likelihood of being targeted by the EPA can be related to firm fundamentals and omitted variables that also jointly determine CEO labor market outcomes. For example, poor firm performance is shown to increase CEO dismissal rates (e.g., Huson et al. 2001). The CEO of a poorly performing firm can attempt to increase profits in the short-run by circumventing investments required by the EPA so as to minimize this dismissal risk. This empirical concern can show up as a positive relationship between CEO turnover and EPA enforcements even though poor firm performance at least partially drives this effect.²⁵

To more precisely capture the impact of EPA enforcement activities on CEO labor market outcomes, I take advantage of substantial increases in annual state EPA budgets as a semi-exogenous source of variation in EPA enforcements in a difference-in-differences (DiD) methodology. This approach is akin to the identification strategy used in Fresard (2010), Flammer (2015), and Fresard

²⁵ Another example is that the political environment at the federal and state levels can influence the frequency of EPA enforcements. For example, Gulen and Myers (2022) show that the battleground status of a state can affect the EPA's enforcement activities. The regression specification used in my paper fully captures the effects of state-level political environment by employing state x year fixed effects. Further, political connections and lobbying efforts (Heitz et al. 2021) can influence EPA activities. To the extent political preferences of firms do not vary over time, these effects are captured by firm fixed effects.

and Valta (2016), where significant cuts in import tariffs are used to identify exogenous shocks to foreign competition. I define a significant increase as at least twice larger than the average annual (absolute) change in EPA budgets in the same state across all years. I am able to identify 37 significant increases in EPA budgets, which are not clustered in any specific time period. This identification strategy relies on the assumption that EPA enforcement activities rise after large increases in state EPA budgets, which is corroborated by data presented in Table IA.7. I next estimate a DiD specification where I examine changes in labor market outcomes following environmental violations within two years around each increase. Because of the well-known problems with staggered DiD settings, I obtain regression estimates using the stacked DiD approach (Gormley and Matsa, 2011; Baker, Larcker, and Wang, 2022).

Table 5 reports results from this estimation. The indicators variables T_0 through T_2 correspond to firms involved in an environmental violation and located in states that experience a large increase in their EPA budgets in the post-increase period, where 0 denotes the year of the increase. The first three columns show that CEOs of firms involved in an environmental violation are much more likely to be dismissed following a substantial increase in state EPA budgets. For example, the coefficient estimate of 0.020 on T_0 suggests an increase of 2 percentage points in CEO dismissal rates, which is significant at the 1% level. No such effect is observed in the year prior to the large increase in state budgets as indicated by the coefficient estimate on T_{-1} . These effects remain robust to alternative measures of environmental violation intensity as demonstrated in the next two columns.

CEOs also experience a sharp decline in the number of external board directorships more so in the aftermath of a large increase in their states' EPA budgets. Across the last three columns, the number of external board seats held by CEOs of firms involved in an environmental violation decreases significantly around large state budget increases. For example, column (4) reports a statistically significant coefficient estimate of -0.145 on T_1 , pointing to a 12.1% decline in external board memberships for an average CEO. Overall, Table 5 shows that the previously reported results are not fully driven by endogeneity issues, and the labor market penalties imposed on CEOs become more pronounced when firms are subject to greater enforcement intensity.

I also undertake an alternative approach to establish identification by using the BP oil spill in 2010. Similar to Dyck et al. (2019), I examine if changes in CEO labor market outcomes differ within two years after the BP oil spill in 2010 in a DiD framework. In this estimation, firms in the oil and gas extraction sector serve as the treatment sample and other firms are used as the control sample. Results from this estimation are reported in Table IA.8. The first three columns show that firms in the energy sector are more inclined to dismiss their CEOs following an environmental violation compared to non-energy firms in the aftermath of the BP oil spill. For example, column (1) reports a coefficient estimate of 0.302 on T_1 , suggesting a considerable increase in CEO dismissal rates following the BP oil spill for energy firms involved in environmental violations. CEOs of these firms are also penalized in the form of fewer board seats compared to other firms following environmental violations around the BP oil spill, but the effect is not always statistically significant, partially due to small sample size. Overall, this table further shows the existence of consequences faced by CEOs for breaching environmental regulations, similar to the results in Table 5.

5.7. Supplemental Tests

In this section, I report results from four supplemental tests and evaluate the sensitivity of the main results to various robustness checks. Starting with the supplemental tests, I first show in Table IA.9 that in general, the career related effects of EPA enforcements do not extend to other top executives such as COOs and CFOs, in line with the central role of CEOs in taking charge of corporate policies.

Second, the offending CEOs are much less likely to be offered a CEO position at a comparable publicly traded firm within three years following the dismissal, as reported in Table 6. The CEOs who were previously dismissed following an EPA enforcement are also significantly much less likely to land on a similar CEO job in the future compared to CEOs dismissed for other reasons. Column (1) shows that CEOs are 19.9% less likely to become a CEO of another publicly traded firm within three years of dismissal if the dismissal was following an EPA enforcement. This compares to a 11.5% lower likelihood of being offered a CEO position if the dismissal was due to another reason. The difference between these two coefficient estimates is statistically different as reported in the last row of the table (p -value = 0.002). Later columns show that such effects do not extend to other top executive titles,

suggesting that CEOs are the main executives penalized by their firms' environmental wrongdoings. This result is consistent with Efendi et al. (2013), who find that the CEOs displaced following the option backdating scandal are less likely to be rehired at comparable positions.

Third, I examine total CEO compensation around EPA enforcements, and find no robust changes in CEO pay within three years around the environmental violations, as reported in Table IA.10. While CEOs of firms implicated in environmental violations might be compensated in advance for the increased risk of dismissal (e.g., Peters and Wagner, 2014), the findings presented in this table show do not corroborate this idea.²⁶ Finally, I examine if the labor market consequences of environmental violations are different between the initial and repeat violators of environmental laws. Some violations may be accidental, and thus, may be less costly to the involved CEOs. I use two variables to proxy for accidental violations: initial versus repeat violations and corporate ESG controversies score from Refinitiv. Panel A of Table IA.11 shows that only repeat violations of environmental laws are penalized. CEO dismissals, changes in the number of external directorships, and shareholder support in elections generally occur for repeat violations. At the same time, Panel B shows no additional penalty imposed on CEOs of firms with fewer ESG controversies, which are more likely to experience accidental violations.

In terms of additional robustness checks, first, I repeat the main tests in an alternative sample in Table IA.12 where I use only firms that have been subject to an EPA enforcement as an internal validity check. Next, I test whether the results are sensitive to excluding firms in industries with the most violations (utility firms) and with the least violations (financial firms) and report the results in Table IA.13. I also control for the corporate ESG profile as reported in Table IA.14, and the presence of other types of corporate misconduct as reported in Table IA.15.²⁷ I then re-estimate the main tests using firms with CEOs younger than the age of 65, as older CEOs may be more likely to retire

²⁶ This finding may stem from CEOs underestimating or being unaware of the job-market risks related to environmental misconduct. This can explain their willingness to accept additional job-market risk without corresponding compensation. Addressing this awareness gap can motivate CEOs to place a higher priority on environmental stewardship within their organizations.

²⁷ The corporate misconduct events used in Table IA.15 are the option backdating scandal, earnings restatements, corporate bankruptcy, dividend cuts, and acquisitions, all of which are shown by the prior studies to affect labor market outcomes for CEOs and directors. I obtain data on the option backdating scandal from the Wall Street Journal (see <https://www.wsj.com/public/resources/documents/info-optionsscore06-full.html>), data on earnings restatements from Audit Analytics, and data on bankruptcy, de-listings, and acquisitions from Capital IQ.

voluntarily from their CEO and board posts instead of being dismissed by the firm (Table IA.16). Further, I use the total cost of EPA enforcement as an alternative measure of EPA enforcement intensity (Table IA.17). Across all these tests, I find robust evidence that the CEOs of firms engaged in EPA enforcements experience a higher likelihood of CEO turnover and a significant decline in their external board directorships.²⁸

6. Potential Mechanisms of the Labor Market Effects

Having documented the labor market consequences to CEOs, in this section I attempt to identify the channels through which these effects can occur. In particular, I examine the role of shareholder voting in directorial elections and the presence of SRIs separately and jointly around the environmental violations.

6.1. The Role of Shareholder Voting in Directorial Elections

The ability of shareholders to replace ineffective directors is one of the most important aspects of corporate governance. This ensures the proper functioning of the board of directors and helps align the interests of shareholders and the board of directors. Consistent with this argument, Cai et al. (2009) find that shareholder votes in director elections respond to director performance, and Aggarwal et al. (2019) find that shareholder support at director elections affects director turnover propensity and penalties in the directorial labor market. More closely related to my study is Ertimur et al. (2012), who study the reputational penalties emanating from the option backdating scandal. They find that compensation committee members are penalized in terms of votes withheld when up for election. Further, Brochet and Srinivasan (2014) find less shareholder support in director elections when firms

²⁸ I also examine the stock market reaction to the revelation of EPA enforcement activity. Panel A of Table IA.18 shows a significant decline in abnormal stock returns by about 0.42% and 1.03% within 2 and 10 days around the revelation of EPA enforcements where I use the four-factor model as in Carhart (1997) to estimate the abnormal returns. The long event windows might be more suitable in my setting because of the several days of lag between the EPA enforcement revelation and its coverage by the media. The sample size in this analysis becomes small due to missing daily returns data for some firms. Panel B uses these abnormal returns as another measure of EPA enforcement intensity and shows that the labor market outcomes for CEOs are related to the cumulative abnormal returns in the longer event window of (-10, +10), but this result is not robust to the shorter event window of (-2, +2).

are involved in financial fraud.²⁹ Following these studies, I examine if shareholders voice their dissatisfaction with the offending CEOs in their elections to other boards as directors.

To test this conjecture, I obtain data on director elections from ISS Voting Analytics database. Focusing on agenda items related to director elections, I then extract director names from the ballot item description field and match to BoardEX dataset by director last name, CUSIP, and year. The resulting sample size for the regression analysis contains about 135,000 director-firm-year observations between 2003 and 2020.³⁰ Table 1 shows the average shareholder opposition is 4.91%, compared to the average of 5.86% reported in Aggarwal et al. (2019) and 5.5% in Ertimur et al. (2012). I also create a dummy variable based on shareholder disapproval rates greater than 10% as an additional proxy for shareholder voting patterns.

Panel A of Table 7 presents regression estimates of the impact of EPA enforcements on shareholder voting on CEOs' elections to other boards as directors. Because firms have multiple directors, I include director fixed effects in addition to firm, state x year, and industry x year fixed effects employed in the previous tables. This ensures a perfect control of time-invariant director characteristics such as talent, gender, and education. Column (1) reports a coefficient estimate of 0.013 (t-stats = 3.274) on the existence of EPA enforcements against the firm, suggesting that shareholders increase their opposition to the elections of offending CEOs to their boards as directors. The shareholder opposition is also economically significant, a 26.5% increase in opposition for an average firm. Opposition also increases significantly with EPA enforcement intensity as reported in the next two columns. I also find a statistically significant and positive coefficient estimate on the shareholder dissent dummy variable as reported in the final three columns. For example, column (4) reports a coefficient estimate of 0.077 on the EPA dummy variable, which is both statistically and economically significant.

As a whole, these results suggest that CEOs of offending firms receive significantly less voting support on elections to other boards. This finding complements the previously documented decline in external board memberships for these CEOs in two ways. First, this is another reputational cost to

²⁹ Further, Fischer, Gramlich, Miller, and White (2009) show that shareholder vote approval in director elections predicts stock price changes around management turnover announcements. Del Guercio et al. (2008) find that firms targeted by vote-no campaigns receive less shareholder support for their directors.

³⁰ Voting Analytics data are available only after 2002.

the CEO of firms involved in environmental misconduct. Such CEOs are penalized in the labor market by lower shareholder support in elections to other firms' boards. Second, voting at board elections can explain the loss of external directorships for the offending CEOs as prior research shows that shareholder support in board elections predicts director turnover (Aggarwal et al. 2019).

6.2. The Role of Socially Responsible Investors

I next examine the role of SRIs in disciplining CEOs involved in EPA enforcements. SRIs aim to integrate ESG concepts into their investment strategies using a variety of methods including activism, and positive and negative screening (e.g., Kruger et al. 2020; Dimson et al. 2021). Thus, SRIs likely focus on corporate environmental activities more than other shareholders do. In the context of my paper, they may press firms for greater penalties imposed on the CEOs and directors involved in environmental misconduct given their significant power and resources to influence corporate behavior, as assets under their management are estimated to be about \$17.1 trillion as of 2020, which is explicitly linked to ESG issues.³¹

I use two distinct ways to identify SRIs. These are based on being signatories to the United Nations Principles for Responsible Investment (UN PRI) and on the average ESG ratings of investors' constituent firms. Panel A of Table 1 reports that the average SRI equity ownership is 11.4% for the first SRI measure and 18.7% for the second SRI measure.³² In order to examine the potential effects of SRIs on disciplining CEOs, I use an interaction term between SRI ownership and the EPA enforcement activity. If SRIs play any important role, the impact of EPA enforcement activity documented in earlier tests should amplify external and internal penalties on CEOs of firms engaging in environmental wrongdoings. Results from this estimation are reported in Panel B of Table 7. The first three columns show results on the propensity to dismiss the CEOs involved in EPA

³¹ The literature on SRIs focuses on whether their investment activities are aligned with the stated goal of sustainability. Consistent with these goals, SRI investors are found to improve firms' ESG ratings and engage with their portfolio firms (Dyck et al. 2019; Kim et al. 2019; Kruger et al. 2020; Dasgupta et al. 2021; Dikolli et al. 2022). However, there is also evidence that SRIs fall short of their promise on ESG goals, often referred to as greenwashing (e.g., Heath et al. 2022; Kim and Yoon 2021).

³² I focus on results from the first classification in the main tables and report results on the latter classification in Table IA.19. The construction of both environmental activism measures is explained in detail in the internet appendix. Further, I control for institutional ownership in my tests to ensure the results are not due to a general effect of monitoring by institutional investors (Chen, Dong, and Lin, 2020).

enforcements as the dependent variable. SRI ownership is significantly related to the likelihood of CEO dismissal across all three measures of EPA enforcement measures. Thus, they seem to play an important role in dismissal rates of CEOs involved in environmental misconduct. For example, the coefficient estimate of 0.087 (t-stats = 3.441) in column (1) implies that the likelihood of CEO dismissal following an EPA enforcement action increases by 19.6% for a firm in the top quartile of SRI ownership compared to the one in the bottom quartile of SRI ownership. The next three columns show robustly that the number of external board memberships decreases with EPA enforcement intensity and SRI ownership. For example, column (4) shows a coefficient estimate of -0.393 (t-stats = -3.086) on the enforcement dummy. This implies that the number of board seats of CEOs following an EPA enforcement action declines by 6.44% for a firm in the top quartile of SRI ownership compared to the one in the bottom quartile of SRI ownership. In the last three columns, I examine the voting patterns of SRIs in elections of CEOs of violating firms on their external board directorships, and find that shareholder support in these elections decreases with the magnitude of SRI ownership. This finding suggests that one of the channels through which SRIs affect labor market outcomes appears to stem from their voting activities on director elections.³³ This is in line with Dikolli et al. (2022) on the SRIs' support on environmental shareholder proposals. Overall, these results suggest that SRIs respond to a corporate violation of environmental laws by disciplining CEOs of the involved firms. This behavior of SRIs also signals that they do not engage in greenwashing.

7. Why do Shareholders Care about Environmental Violations?

A pertinent question arises as to whether the impact of environmental violations on labor market outcomes is contingent upon the fundamental motives behind shareholder responses. Shareholders might deem environmental violations undesirable and be inclined to hold CEOs

³³ These results might capture the impact of concentrated ownership structure rather than SRI ownership, as concentrated ownership can affect the incentives and ability of institutional investors to monitor and influence corporate policies (e.g., Hartzell and Starks (2003)). In Table IA.20, I re-estimate Panel A of Table 7 after including the HHI index of institutional ownership to control for the effects of concentrated ownership on the results. This table shows no substantial change in the statistical significance and size of the key coefficient estimates on the key interaction terms. The coefficient estimate on concentrated ownership is negative and statistically significant, suggesting that monitoring by concentrated institutional investors is a substitute for disciplining CEOs. The results are also robust to controlling for other governance mechanisms (Table IA.21) as well as an alternative sample that uses only firms that have been subject to an EPA enforcement (Table IA.22).

accountable for them due to the severity of legal penalties, the potential for future liabilities stemming from the violations, and the adverse publicity linked to media coverage of these violations.

The first mechanism, involving penalties imposed on firms by federal, state, and local authorities, is analyzed earlier as one of the measures of environmental violation intensity. The findings indicate that the economic impact of monetary penalties for environmental violations is relatively minimal, corroborating prior studies (e.g., Stefanutti, 2022). In the context of my paper, this finding implies that the occurrence of an environmental violation holds greater significance than the immediate financial costs borne by the firm, highlighting the importance of additional considerations. Among these, the prospect of future liability risks is prominent. Environmental violations can expose a company to future liabilities, such as long-term clean-up obligations, which can create ongoing costs and uncertainties that adversely affect firm performance. Reputational damage is another key consideration. Greater media coverage of environmental violations can tarnish a company's reputation, as customers, investors, and other stakeholders might be hesitant to associate with a firm viewed as environmentally irresponsible. Accordingly, this section examines the role of both mechanisms in explaining the labor market repercussions for CEOs involved in environmental violations.

I use the type of environmental violation as a proxy for potential future liability risk. Existing research indicates that changes in environmental liabilities, arising from either CERCLA or RCRA, can have important consequences on firms' behaviors and environmental violations (Akey and Appel, 2021; Bellon, 2023; Ohlrogge 2020; Chen et al. 2022). Liabilities under CERCLA can be particularly substantial, as the act enforces strict liability for cleanup expenditures and damages related to hazardous substances, regardless of whether the firm was negligent in handling these substances (Kirsch and Raffetto, 2021; Akey and Appel, 2021; Bellon, 2023). CERCLA liability can apply retroactively and encompass costs associated with long-term remediation, natural resource damages, and health assessments. Similarly, RCRA incorporates several strict liability provisions (Ohlrogge, 2020; Chen et al. 2022; Bellon, 2023). In contrast, CAA (Clean Air Act) assigns liability only in cases of negligence or recklessness. Therefore, companies that have been subjected to CERCLA and RCRA enforcement actions are more likely to encounter future liability risks.

Consequently, I disaggregate the primary EPA enforcement variables according to the category of violation: CERCLA and RCRA, CAA, and other types of violations. If future liability risk is of significance to shareholders, CEOs should face more stringent consequences for violations under CERCLA and RCRA compared to other categories including CAA. The results from this analysis are reported in Panel A of Table 8. First three columns show that CEOs are more likely to be dismissed following environmental violations related to CERCLA and RCRA across all three measures of environmental violations. For example, column (1) shows that CEOs are 11 percentage points more likely to be dismissed following the revelation of such environmental violations. The next three columns generally show that these CEOs also hold fewer external board seats in the aftermath of such violations. Environmental violations related to CAA do not exert a statistically significant effect on CEOs' labor market outcomes. Overall, this panel shows that future liability risks associated with environmental violations are important to shareholders when they consider whether to hold CEOs accountable.

I next examine the effects of media exposure arising from environmental violations on labor market outcomes. Greater media coverage can tarnish a company's reputation, as customers, investors, and other stakeholders might be hesitant to associate with a firm viewed as environmentally irresponsible (e.g., Klassen and McLaughlin, 1996; Flammer, 2015; Kruger, 2015). Consequently, media exposure of such misconduct can serve as a catalyst, prompting shareholders to hold the CEO accountable, potentially leading to dismissal (Farrell and Whidbee, 2002). As a proxy for media exposure, I use the number of news articles that mention both the firm and EPA violations for the firms involved in environmental violations scaled by firm size. Using Factiva news searches, I manually compile the frequency with which a firm is referenced in the news during the period surrounding environmental violations.³⁴ I then use an interaction term between the EPA enforcement measures and media exposure to test whether the labor market effects of environmental violations to CEOs vary based on media coverage. Panel B of Table 8 shows that media coverage does not have a statistically significant effect on the labor market outcomes for CEOs. These results echo that

³⁴ The keywords used in the news search are derivatives of environmental violations and EPA together with the firm name. I limit the search to major news and business sources such as Dow Jones Newswires, Reuters Newswires, Press Release Wires, and Wall Street Journal.

reputational losses may not accrue in environmental violations (Karpoff, 2012). I also employ an annual indicator variable for the media coverage of a firm for an environmental controversy linked to its operations from Refinitiv, and obtain similar results. These results suggest that media exposure is not important as the future liability risks on the labor market effects of environmental violations to CEOs.

8. Conclusion

EPA enforcements constitute a serious violation of environmental laws, and accordingly, they represent negative corporate environmental externalities. Despite the recent interest in mechanisms mitigating environmental harm caused by corporate actions, little is known about the role of CEO incentives. If the goal is to better understand the reasons behind why firms (fail to) adopt certain environmental programs, we must understand the incentives of key decision makers such as CEOs leading the firms. Holding CEOs responsible for the environmental failures in the labor market can be an effective way to align CEOs' interests with the environmental goals of the society. In this paper, I examine the career consequences of environmental misconduct to CEOs. This ex-post settling up as hypothesized by Fama (1980) and Fama and Jensen (1983) can provide incentives for CEOs to take more environmentally friendly policies ex-ante.

I document that the labor market imposes significant monetary and non-monetary costs on the CEOs violating environmental laws in the form of a loss of compensation, reputation, prestige and power due to the dismissal from the CEO position and external board memberships. These effects occur solely in recent years. The channels through which these effects occur are shareholder support in directorial elections and ownership by SRIs. Altogether, these results suggest that CEOs are penalized for environmental failures. This is important because without an adverse consequence of environmental misbehavior to key corporate decision makers, similar corporate actions are likely to be repeated. The results also provide evidence that SRIs are associated with greater disciplinary actions taken against offending CEOs, which points to a bright side of these investors. SRIs as a market-based solution can supplement EPA enforcements as regulatory actions to encourage firms to improve environmental performance.

A limitation of this study is that it cannot address the potential impact on the labor market outcomes of environmentally friendly actions. The labor market effects from a negative outcome (i.e., EPA enforcements as examined in this study) may not be same as the effects from encouraging a positive outcome (i.e., investing in green energy). Another limitation by design is that it focuses on illegal corporate actions that create negative environmental externalities. However, firms can also take legally allowed actions that create negative environmental externalities. These questions, which complement my study, can be answered by future research.

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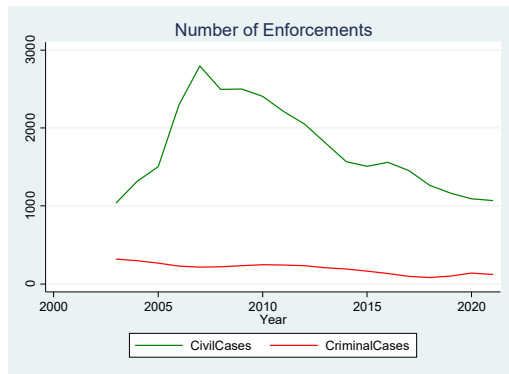
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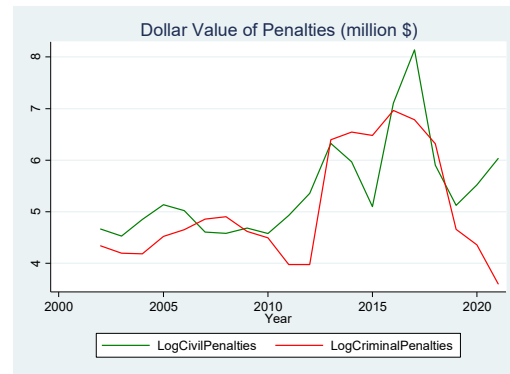
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(a) Number of Enforcements



(b) Dollar Value of Penalties

Figure 1. These figures display EPA enforcement statistics over time. Figure 1a reports the total number of civil and criminal enforcement cases, and Figure 1b reports the natural logarithm of the dollar value of environmental violation penalties. The two-year moving averages of the time series are applied to smooth the data. Source: EPA Division of Enforcement.

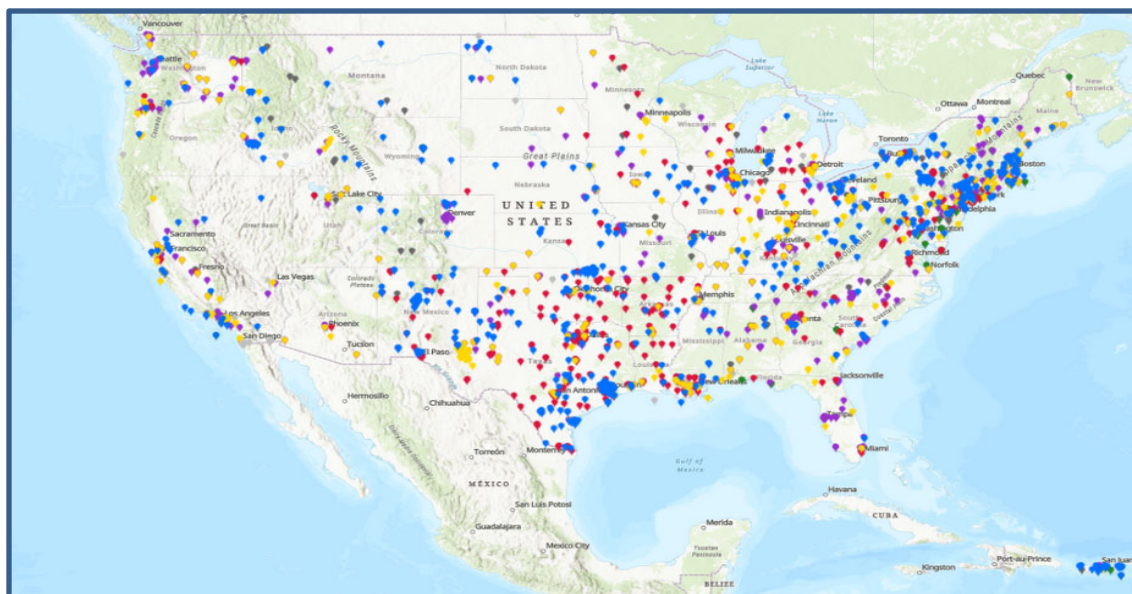
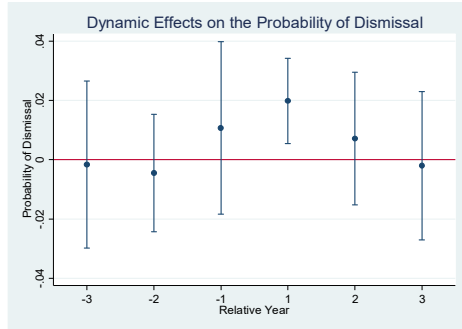
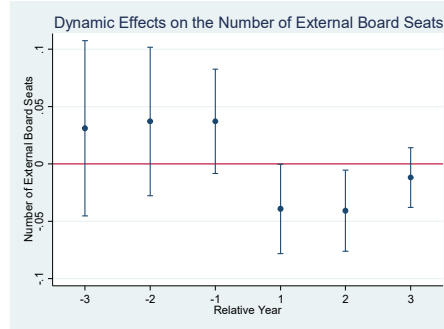


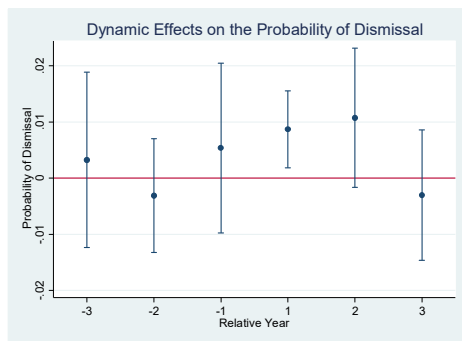
Figure 2. This figure displays the geographical distribution of the EPA enforcement cases by major enforcement area. Blue, yellow, red, and purple dots represent water, air, waste, and chemical related enforcement areas, respectively. Source: 2021 EPA annual enforcement report.



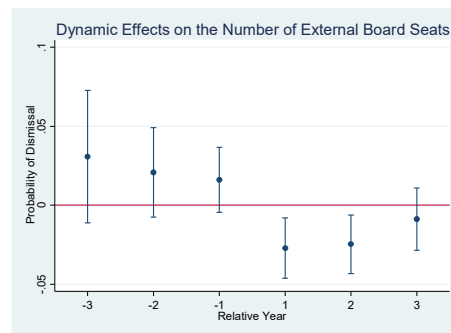
(a) Probability of CEO Dismissal
Enforce Dummy



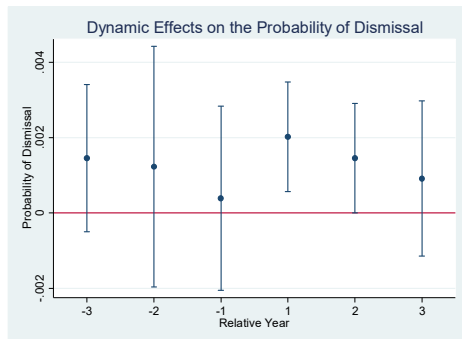
(b) Number of External Board Seats
Enforce Dummy



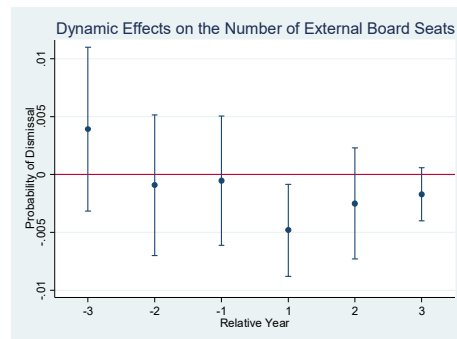
(c) Probability of CEO Dismissal
Enforce Case



(d) Number of External Board Seats
Enforce Case



(e) Probability of CEO Dismissal
Enforce Penalty



(f) Number of External Board Seats
Enforce Penalty

Figure 3. This figure presents the dynamic effects of the regression estimates of changes in the probability of CEO dismissal (Figure 3a, 3c, and 3e) and the number of external board seats (Figure 3b, 3d, and 3f) within three years around environmental violations for each of the three environmental violation measures, respectively. Coefficient estimates reported in Table IA.5 are used in plotting the figures. The 95% confidence intervals are based on standard errors clustered by state and year.

Appendix

Table 1. Variable Definitions

Variable Name	Definition
<u>EPA Enforcement Outcomes</u>	
Enforce Dummy	A dummy variable that equals one for firms subject to an enforcement action in a given year, zero otherwise. Source: ECHO database.
Enforce Case	The number of enforcement actions a firm is subject to in a given year. Source: ECHO database.
Enforce Penalty	The ratio of the dollar value of federal, state, and local penalties to total assets, where assets are measured in \$millions. It is set to zero for firms without an enforcement action. Source: ECHO database.
Enforce Total	The ratio of the dollar value of federal, state, and local penalties, injunctive reliefs, and supplemental environmental projects to total assets, where assets are measured in \$millions. It is set to zero for firms without an enforcement action. Source: ECHO database.
<u>Labor Market Outcomes</u>	
# External seats	Total number of outside directorships held by each CEO annually in listed firms. It excludes the board seat held by the CEO in the firm subject to the EPA enforcement. Source: BoardEx.
CEO dismissal	A dummy variable that equals one if the CEO is dismissed in the current year, zero otherwise. Source: BoardEx.
Opposition %	The percentage of shareholder votes cast against or abstained in director elections. It is defined as (votes against + votes abstain) / (votes against + votes abstain + votes for). Source: Voting Analytics and BoardEx.
Opposition dummy	A dummy variable that equals one if the percentage of shareholder votes cast against or abstained is greater than or equal to 10%. Source: Voting Analytics and BoardEx.
<u>Firm characteristics</u>	
SRI (UN PRI based) %	Percentage of shares owned by institutional investors that are signatories to UN PRI. See the internet appendix for details about the construction of this variable. Source: 13F filings and UN PRI webpage at the link https://www.unpri.org/signatories .
SRI (ESG rating based)	Percentage of shares owned by SRIs, where activist is defined based on the average environmental rating of the portfolio firms. See the internet

appendix for details about the construction of this variable. Source: 13F filings and Refinitiv.

EBIT ratio	Ratio of EBIT to total assets. Source: Capital IQ.
Log Assets	Natural logarithm of the book value of total assets in \$ millions. Source: Capital IQ.
Z-score	Altman's z-score, calculated as $3.3 * \text{Pre-Tax Income} + \text{Sales} + 1.4 * \text{Retained Earnings} + 1.2 * (\text{Current Assets} - \text{Current Liabilities}) / \text{Book assets}$. Source: Capital IQ.
Board independence %	Ratio of the number of outside directors to board size. Source: BoardEx
Institutional ownership %	Percentage of shares owned by institutional investors. Source: 13F filings.
Inside ownership %	Percentage of shares owned by family and employees. Source: Refinitiv.

Director characteristics

Log Age	Natural logarithm of the CEO (director) age. Source: BoardEx.
Log Tenure	Natural logarithm of the number of years the CEO (director) spent in the CEO (director) role. Source: BoardEx.
Female	Gender of the CEO (director). Source: BoardEx.
Number of awards	The number of business-related awards the CEO (director) is given. Source: BoardEx.
Log CEO compensation	Natural logarithm of the CEO's total compensation calculated as the sum of salary, bonus, the value of equity and option awards, pension contribution, and other compensation. Source: BoardEx.

Table 1. Descriptive Statistics

This table reports descriptive statistics for the main variables used in the analysis. The sample includes all U.S. firm-year observations from BoardEX with an identifiable CEO from 2002 to 2020. Table 1 in the Appendix provides variable definitions. I winsorize all continuous variables at the one percent level and use one-year lagged values of time-varying independent variables.

Panel A. Variables used in the analysis

Variable Name	Mean	Median	Std Dev
# External seats	1.196	1.000	0.772
CEO dismissal	0.087	0.000	0.281
Opposition	0.049	0.020	0.078
Opposition dummy	0.138	0.000	0.344
Enforce Dummy	0.044	0.000	0.205
Enforce Case	0.081	0.000	0.446
Enforce Penalty	0.208	0.000	1.660
SRI % (UN PRI based)	0.114	0.026	0.153
SRI % (ESG rating based)	0.187	0.017	0.280
Board independence %	0.817	0.857	0.101
Inside ownership %	0.043	0.000	0.123
Institutional ownership %	0.594	0.654	0.325
Log Assets	6.679	6.673	2.105
EBIT ratio	0.001	0.052	0.574
Z score	-0.007	0.963	10.847
Log CEO age	4.010	4.025	0.147
Log Tenure	2.179	2.332	1.024
Female	0.034	0.000	0.181
Number of awards	0.037	0.000	0.367
Log CEO compensation	8.059	8.060	1.157

Panel B. Distribution of EPA enforcement intensity by industry

Industry Name	Enforce Dummy	Enforce Case	Enforce Penalty
Agriculture, Forestry, And Fishing	0.0123	0.0761	0.0123
Construction	0.0240	0.1216	0.0536
Finance, Insurance, And Real Estate	0.0017	0.0036	0.0023
Manufacturing	0.0670	0.3749	0.1225
Mining	0.0791	0.3913	0.1726
Retail Trade	0.0576	0.1840	0.0904
Services	0.0088	0.0328	0.0108
Transportation, Communications, Electric, Gas, And Sanitary Services	0.1127	0.3069	0.2163
Wholesale Trade	0.0291	0.1252	0.0463

Panel C. Distribution of average EPA enforcement intensity over time

Year	Enforce Dummy	Enforce Case	Enforce Penalty
2002	0.0679	0.2725	0.1358
2003	0.0718	0.2962	0.1554
2004	0.0432	0.2078	0.0823
2005	0.0406	0.2078	0.0755
2006	0.0497	0.2378	0.0888
2007	0.0406	0.1960	0.0756
2008	0.0428	0.2380	0.0786
2009	0.0416	0.2455	0.0773
2010	0.0500	0.3063	0.0879
2011	0.0480	0.2347	0.0856
2012	0.0494	0.2446	0.0880
2013	0.0466	0.2437	0.0805
2014	0.0447	0.1758	0.0854
2015	0.0420	0.1823	0.0786
2016	0.0425	0.1859	0.0696
2017	0.0457	0.1676	0.0792
2018	0.0327	0.1309	0.0599
2019	0.0316	0.1476	0.0593
2020	0.0376	0.1410	0.0671

Table 2. Labor Market Consequences of EPA Enforcements to CEOs

This table presents regression estimates of the labor market consequences of EPA enforcements to CEOs. The sample includes all U.S. firm-year observations from BoardEX with an identifiable CEO from 2002 to 2020. The dependent variable is the probability of CEO dismissal in Columns 1-3 and the total number of external board directorships held by each CEO in Columns 4-6. The total number of seats excludes the board seat held by the CEO in the firm subject to the EPA enforcement. Results are reported separately for each of the three EPA enforcement intensity measures. The regression specification includes time-varying firm and director specific control variables as well as firm, state-year, and industry-year fixed effects. Table 1 in the Appendix provides variable definitions. I winsorize all continuous variables at the one percent level and use one-year lagged values of time-varying independent variables. The t-statistics appear in brackets below parameter estimates. Robust standard errors are estimated by double clustering at the state and year levels. Asterisks ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Variables	CEO Dismissal Probability			External Board Seats		
	(1)	(2)	(3)	(4)	(5)	(6)
Enforce Dummy	0.019** [2.770]			-0.041** [-2.553]		
Enforce Case		0.009*** [3.223]			-0.028*** [-3.104]	
Enforce Penalty			0.002*** [2.897]			-0.005** [-2.405]
Firm-specific control variables	Yes	Yes	Yes	Yes	Yes	Yes
CEO-specific control variables	Yes	Yes	Yes	Yes	Yes	Yes
Firm FEs	Yes	Yes	Yes	Yes	Yes	Yes
State x Year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Industry x Year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Observations	46,283	46,283	46,283	46,283	46,283	46,283
R-squared	0.229	0.229	0.229	0.728	0.728	0.728

Table 3. Labor Market Consequences of EPA Enforcements Over Time

This table presents regression estimates of the labor market consequences of EPA enforcements to CEOs over time. The dependent variable is the probability of CEO dismissal in Columns 1-3 and the total number of external board directorships held by each CEO in Columns 4-6. It excludes the board seat held by the CEO in the firm subject to the EPA enforcement. The EPA intensity measures are divided into two components, one for the subperiod between 2002 and 2009 and one for the subperiod between 2010 and 2020. Table 1 in the Appendix provides variable definitions. I winsorize all continuous variables at the one percent level and use one-year lagged values of time-varying independent variables. The t-statistics appear in brackets below parameter estimates. Robust standard errors are estimated by double clustering at the state and year levels. Asterisks ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Variables	CEO Dismissal Probability			External Board Seats		
	Enforce Dummy	Enforce Case	Enforce Penalty	Enforce Dummy	Enforce Case	Enforce Penalty
	(1)	(2)	(3)	(4)	(5)	(6)
(a) 2002-2009	0.002 [0.182]	0.002 [0.428]	-0.000 [-0.209]	0.009 [0.317]	0.003 [0.178]	-0.000 [-0.041]
(b) 2010-2020	0.031*** [5.324]	0.015*** [6.769]	0.003*** [3.945]	-0.075*** [-3.319]	-0.053*** [-5.577]	-0.008*** [-3.747]
Firm-specific control variables	Yes	Yes	Yes	Yes	Yes	Yes
CEO-specific control variables	Yes	Yes	Yes	Yes	Yes	Yes
Firm FEs	Yes	Yes	Yes	Yes	Yes	Yes
State x Year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Industry x Year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Observations	46,283	46,283	46,283	46,283	46,283	46,283
R-squared	0.230	0.229	0.229	0.728	0.728	0.728
p-value for (a) = (b)	0.002	0.022	0.004	0.027	0.009	0.086

Table 4. Labor Market Consequences of EPA Enforcements to CEOs: Matching Sample Analysis

This table presents regression estimates of the labor market consequences of EPA enforcements to CEOs in a matched sample. Entropy balancing is used to match the sample of firms subject to EPA enforcements to those without an EPA enforcement based on the following characteristics: the natural logarithm of total assets, the ratio of EBIT to total assets, the ratio of debt to total assets, board independence percentage, inside and total institutional ownership percentage, the natural logarithm of CEO's age and the number of awards in a given year. The dependent variable is the probability of CEO dismissal in Columns 1-3 and the total number of external board directorships held by each CEO in Columns 4-6. It excludes the board seat held by the CEO in the firm subject to the EPA enforcement. Results are reported separately for each of the three EPA enforcement intensity measures. Table 1 in the Appendix provides variable definitions. I winsorize all continuous variables at the one percent level and use one-year lagged values of time-varying independent variables. The t-statistics appear in brackets below parameter estimates. Robust standard errors are estimated by double clustering at the state and year levels. Asterisks ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Variables	CEO Dismissal Probability			External Board Seats		
	(1)	(2)	(3)	(4)	(5)	(6)
Enforce Dummy	0.037*** [3.363]			-0.050* [-1.995]		
Enforce Case		0.014** [2.519]			-0.041*** [-3.132]	
Enforce Penalty			0.002* [1.806]			-0.007** [-2.620]
Firm-specific control variables	Yes	Yes	Yes	Yes	Yes	Yes
CEO-specific control variables	Yes	Yes	Yes	Yes	Yes	Yes
Firm FEs	Yes	Yes	Yes	Yes	Yes	Yes
State x Year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Industry x Year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Observations	46,280	46,280	46,280	46,280	46,280	46,280
R-squared	0.384	0.384	0.383	0.766	0.766	0.766

Table 5. Labor Market Consequences of EPA Enforcements around Large Increases in State EPA Budgets

This table presents regression estimates of changes in labor market outcomes within two years around large increases in state EPA budgets. The indicators variables T_0 through T_2 correspond to firms involved in an environmental violation and located in states that experience a large increase in their EPA budgets in the post-increase period, where 0 denotes the year of the increase. The sample includes all U.S. firm-year observations from BoardEX with an identifiable CEO from 2002 to 2020. The dependent variable is the probability of CEO dismissal in Columns 1-3 and the total number of external board directorships held by each CEO in Columns 4-6. It excludes the board seat held by the CEO in the firm subject to the EPA enforcement. Results are reported separately for each of the three EPA enforcement intensity measures. The regression specification includes time-varying firm and director specific control variables, firm and year fixed effects as well as firm-stack and year-stack fixed effects. Table 1 in the Appendix provides variable definitions. I winsorize all continuous variables at the one percent level and use one-year lagged values of time-varying independent variables. The t-statistics appear in brackets below parameter estimates. Robust standard errors are estimated by double clustering at the state and year levels. Asterisks ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Variables	CEO Dismissal Probability			External Board Seats		
	Enforce Dummy	Enforce Case	Enforce Penalty	Enforce Dummy	Enforce Case	Enforce Penalty
	(1)	(2)	(3)	(4)	(5)	(6)
T_{-1}	0.050 [1.173]	0.028 [1.155]	0.005 [0.755]	0.057 [0.947]	0.002 [0.085]	0.003 [0.681]
T_0	0.020*** [3.585]	0.006** [2.081]	0.001** [2.085]	-0.004 [-0.379]	-0.028*** [-5.626]	-0.001 [-0.565]
T_1	-0.007 [-0.249]	-0.010 [-0.851]	0.004 [0.998]	-0.145*** [-3.046]	-0.075*** [-4.175]	-0.007 [-1.334]
T_2	0.096* [1.797]	0.060** [2.523]	0.005 [1.340]	-0.039 [-0.669]	-0.038 [-1.219]	-0.006 [-0.942]
Firm-specific control variables	Yes	Yes	Yes	Yes	Yes	Yes
CEO-specific control variables	Yes	Yes	Yes	Yes	Yes	Yes
Firm FEs	Yes	Yes	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Firm FEs x Stack FEs	Yes	Yes	Yes	Yes	Yes	Yes
Year FEs x Stack FEs	Yes	Yes	Yes	Yes	Yes	Yes
Observations	120,505	120,505	120,505	120,505	120,505	120,505
R-squared	0.208	0.208	0.208	0.740	0.740	0.740

Table 6. The Probability of Being Rehired as a CEO

This table presents regression estimates of the probability of being hired as a top executive within three years of being dismissed as the CEO of the firm subject to an EPA enforcement. The sample includes all U.S. firm-year observations from BoardEX with an identifiable top executive from 2002 to 2020. The dependent variable is the probability of being a CEO in Column 1, a COO in Column 2, a CFO in Column 3, and either a CEO, COO, or a CFO in Column 4. The regression specification includes time-varying firm and director specific control variables as well as firm, state-year, and industry-year fixed effects. Table 1 in the Appendix provides variable definitions. I winsorize all continuous variables at the one percent level and use one-year lagged values of time-varying independent variables. The t-statistics appear in brackets below parameter estimates. Robust standard errors are estimated by double clustering at the state and year levels. Asterisks ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

	Hired as CEO	Hired as COO	Hired as CFO	Hired as Either
Variables	(1)	(2)	(3)	(4)
(a) Previously dismissed – EPA offender	-0.199*** [-9.816]	-0.027 [-0.806]	-0.115*** [-6.811]	-0.340*** [-8.477]
(b) Previously dismissed – other reason	-0.115*** [-5.674]	-0.049*** [-5.463]	-0.111*** [-8.669]	-0.276*** [-13.974]
Firm-specific control variables	Yes	Yes	Yes	Yes
CEO-specific control variables	Yes	Yes	Yes	Yes
Firm FEs	Yes	Yes	Yes	Yes
State x Year FEs	Yes	Yes	Yes	Yes
Industry x Year FEs	Yes	Yes	Yes	Yes
Observations	63,018	63,018	63,018	63,018
R-squared	0.104	0.105	0.057	0.067
p-value for (a) = (b)	0.002	0.525	0.857	0.169

Table 7. Potential Mechanisms of the Labor Market Effects

This table presents regression estimates of the potential mechanisms through which environmental violations lead to labor market effects. Panel A reports the impact of EPA enforcements on shareholder voting on CEOs' elections to the board. The sample includes all U.S. firm-year-director election observations from BoardEX that are matched to Voting Analytics by director name from 2003 to 2020. Voting Analytics data are available after 2002. The dependent variable is the fraction of votes cast against in director elections in Columns 1-3 and a dummy variable that equals one whenever the shareholder dissent is 10% or higher in Columns 4-6. Panel B presents regression estimates of the impact of SRIs on the labor market consequences of EPA enforcements to CEOs. The dependent variable is the probability of CEO dismissal in Columns 1-3, the total number of external board directorships held by each CEO in Columns 4-6, and the fraction of votes cast against in director elections in Columns 7-9. Table 1 in the Appendix provides variable definitions. I winsorize all continuous variables at the one percent level and use one-year lagged values of time-varying independent variables. The t-statistics appear in brackets below parameter estimates. Robust standard errors are estimated by double clustering at the state and year levels. Asterisks ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Panel A. Shareholder Voting

Variables	Voting Opposition %			Voting Opposition Dummy		
	(1)	(2)	(3)	(4)	(5)	(6)
Enforce Dummy	0.013*** [3.274]			0.077** [2.759]		
Enforce Case		0.003** [2.598]			0.020** [2.193]	
Enforce Penalty			0.001** [2.151]			0.006* [1.920]
Firm-specific control	Yes	Yes	Yes	Yes	Yes	Yes
CEO-specific control	Yes	Yes	Yes	Yes	Yes	Yes
Director FEs	Yes	Yes	Yes	Yes	Yes	Yes
Firm FEs	Yes	Yes	Yes	Yes	Yes	Yes
State x Year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Industry x Year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Observations	134,947	134,947	134,947	134,947	134,947	134,947
R-squared	0.494	0.494	0.494	0.439	0.439	0.439

Panel B. SRI Ownership

	CEO Dismissal Probability			External Board Seats			Voting Opposition %		
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Enforce Dummy x SRI	0.087*** [3.441]			-0.393*** [-3.086]			0.065** [2.375]		
Enforce Case x SRI		0.036** [2.950]			-0.204*** [-3.019]			0.021* [1.861]	
Enforce Penalty x SRI			0.010** [2.188]			-0.035** [-2.463]			0.010* [1.885]
Firm-specific controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
CEO-specific controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Director FEs	No	No	No	No	No	No	Yes	Yes	Yes
Firm FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State x Year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry x Year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	46,283	46,283	46,283	46,283	46,283	46,283	134,947	134,947	134,947
R-squared	0.230	0.229	0.229	0.728	0.728	0.728	0.495	0.495	0.495

Table 8. Labor Market Consequences of EPA Enforcements to CEOs based on Violation Type and Media Exposure

This table presents regression estimates of the labor market consequences of EPA enforcements to CEOs based on violation type and media coverage. In Panel A, environmental violations are decomposed into CERCLA and RCRA violations and CAA violations. Other types of violations make up the reference group. In Panel B, media coverage is defined as the number of Factiva news articles normalized by total assets, where derivatives of environmental violations together with the firm name are used as keywords. The sample includes all U.S. firm-year observations from BoardEX with an identifiable CEO from 2002 to 2020. The dependent variable is the probability of CEO dismissal in Columns 1-3 and the total number of external board directorships held by each CEO in Columns 4-6. The total number of seats excludes the board seat held by the CEO in the firm subject to the EPA enforcement. Results are reported separately for each of the three EPA enforcement intensity measures. The regression specification includes time-varying firm and director specific control variables as well as firm, state-year, and industry-year fixed effects. Table 1 in the Appendix provides variable definitions. I winsorize all continuous variables at the one percent level and use one-year lagged values of time-varying independent variables. The t-statistics appear in brackets below parameter estimates. Robust standard errors are estimated by double clustering at the state and year levels. Asterisks ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

Panel A. Violation type

Variables	CEO Dismissal Probability			External Board Seats		
	Enforce Dummy	Enforce Case	Enforce Penalty	Enforce Dummy	Enforce Case	Enforce Penalty
	(1)	(2)	(3)	(4)	(5)	(6)
CERCLA & RCRA Violations	0.110** [2.659]	0.031* [1.900]	0.009*** [3.162]	-0.105** [-2.238]	-0.024 [-0.661]	-0.011* [-1.834]
CAA Violations	0.003 [0.179]	-0.004 [-0.811]	0.001 [1.099]	-0.033 [-1.523]	-0.004 [-0.416]	-0.000 [-0.154]
Firm-specific control variables	Yes	Yes	Yes	Yes	Yes	Yes
CEO-specific control variables	Yes	Yes	Yes	Yes	Yes	Yes
Firm FEs	Yes	Yes	Yes	Yes	Yes	Yes
State x Year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Industry x Year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Observations	46,283	46,283	46,283	46,283	46,283	46,283
R-squared	0.230	0.230	0.230	0.728	0.728	0.728

Panel B. Media exposure

Variables	CEO Dismissal Probability			External Board Seats		
	(1)	(2)	(3)	(4)	(5)	(6)
Enforce Dummy x Media Coverage	3.792 [0.806]			7.897 [1.142]		
Enforce Case x Media Coverage		2.459 [0.835]			2.022 [0.464]	
Enforce Penalty x Media Coverage			0.560 [0.776]			0.766 [1.260]
Firm-specific control variables	Yes	Yes	Yes	Yes	Yes	Yes
CEO-specific control variables	Yes	Yes	Yes	Yes	Yes	Yes
Firm FEs	Yes	Yes	Yes	Yes	Yes	Yes
State x Year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Industry x Year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Observations	45,940	45,940	45,940	45,940	45,940	45,940
R-squared	0.230	0.230	0.230	0.728	0.728	0.728

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