# The Positive Spillover Effects of Environmental Violations: Board Interlocks and Corporate Sustainability*

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## Abstract

We identify board directors of US firms involved in different cases of corporate infringements and examine whether such negative events are associated with specific changes in corporate sustainability policies in the other firms where directors also serve. Our results suggest that following environmental violations, directors update their beliefs regarding the environmental risks associated with firms' operations, thereby influencing the improvement of environmental performance across the interlocked firms they serve. This positive spillover effect suggests that professional directors continue to learn from and transfer their recent experiences to their interlocked firms, even after negative corporate events. To the best of our knowledge, this is the first empirical study to directly link negative corporate environmental events in one firm to changes in environmental performance in other interlocked firms. Finally, we provide different cross-sectional tests to support the role of directors in improving firms' environmental performance and the impact of the penalty size.

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## 1. Introduction

Sustainability issues are increasingly important for corporations as poor environmental performance in the areas of energy, waste, water, and emissions expose a company to fines, lawsuits, regulatory exposure, reputational impact and increased operating costs. Following environmental scandals like the BP explosion in the Gulf of Mexico, in 2010, the Volkswagen Dieselgate emissions scandal, in 2015, or the recent controversies associated with the presence of "forever chemicals" toxicities in the water supply of different major US cities, sustainability issues became a priority for corporate boards, as environmental violations threaten the regular operations of firms and have a negative impact on key company stakeholders (Karpoff, Lott and Wehrly, 2005).

While corporate boards play a major role in overseeing a company's sustainability strategy and the overall risk management practices, existing evidence shows that there is only a limited presence of professional directors on the boards of US firms with real hands on sustainability experience (IRRC Institute, 2016). For example, in the S&P 500, only 10 percent of directors reported having functional experience in environment/climate in 2023; more broadly, 13 percent of directors reported having experience in ESG matters (Tonello 2023).[1] In a context where corporate boards face new, unprecedented, environmental challenges, interlocked directors – that serve in multiple corporate boards simultaneously – can serve as a valuable and constant conduit for firsthand sustainability experience, and a source of

[1] Please see: https://corpgov.law.harvard.edu/2023/12/07/recent-trends-in-board-composition-and-refreshment-in-the-russell-3000-and-sp-500

continuous learning for corporate boards on relevant matters such as environmental compliance. In this paper, we examine whether and when interlocked directors transfer sustainable-related knowledge across firms, as directors who are exposed to a new case of corporate environmental or social violations in one of their directorships can update their board experience and personally reexamine the sustainability risks of running a corporate operation.

Beside the well-documented influence of the board's characteristics on firm's policy choices, new empirical evidence shows how recent directors' experiences can influence specific corporate policy choices (Gopalan, Gormley, and Kalda , 2021; Iliev and Roth, 2023). In this paper we focus on corporate violations such as environmental and social violations as an important recent experience that directors face and impact their preferences towards environmental and social issues, their understanding of potential sustainability risks in the firms that there are board members and their perceptions about the links between corporate behavior and society as a whole.

Personal experience with corporate violations will likely affect a director's view on both the probability and the costs of such events. Existing studies show that the revelation of corporate misconduct has an impact on the personal reputation of professional directors (see Ertimur et al. (2012); Fich and Shivdasani (2007); Farber (2005); Srinivasan (2005)). We argue that a close exposure to a case of corporate misconduct can reshape a director's support for Corporate Social Responsibility (CSR) policies as mechanism to avoid future negative corporate events that could affect firm's operations and sustainability.

Our contribution to the corporate governance literature is showing that there is a positive spillover effect of board interlocks: professional directors who personally experience corporate violations support new sustainability initiatives in the other companies in which they are also directors. While corporate scandals have a negative impact on corporate value and the personal reputation of professional directors, there is also a bright side: the revelation of a corporate infringement modifies a directors' knowledge and reshapes their preferences for a more responsible relationship between corporate policies and different stakeholders.

To the best of our knowledge, we present the first empirical study to directly link the impact of environmental violations in one firm to changes in environmental performance (measured as CSR) in the other interlocked firms. The existing body of literature that has examined the links between corporate misconduct and CSR has focused on the analysis of remedial actions taken by tainted firms as a response to their reputational damages ((Farber (2005)). Wilson (2008 Chakravarthy, deHaan, and Rajgopal (2014)).

There are at least two main reasons why directors might support new sustainability initiatives, even across their various directorships: 1) directors revise their beliefs regarding the probability of corporate violations and 2) directors better assess the penalty costs imposed by the regulator that affect firm's operations. For instance, the Environmental Protection Agency (EPA) could impose a monetary fine, demand changes in a firm's operations (resulting in compliance costs), and require supplemental environmental projects (SEPs) to protect and enhance public health and the environment. In summary, these fines,

SEPs, and compliance costs collectively represent significant penalties imposed by the EPA, which directors would seek to avoid in the future.[2]

Iliev and Roth (2023) show that the exposure of company directors to information on new international environmental regulations leads to the implementation of environmental policies in their companies. Their interpretation is that the acquisition of new director sustainability knowledge provides valuable experience to directors on how to better formulate the relationship between the firm and the different societal stakeholders. In this study, we go further and we posit that cases of environmental and social violations can modify a director's perception of the environmental and social risks around corporate violations and provide new information on the importance of environmental and social policies to avoid further penalties in the interlocked firms. Different from experience acquired by regulatory changes in other countries, corporate violations are events that could be directly linked to firm's operations and directors can assess better the negative implication of having bad environmental/social policies in their firms.

Our empirical analysis is based on pairs of firms connected by common directors and a sample of firms that were involved in different kinds of corporate infringements, i.e., environmental and social violations. We first use the information on directors' affiliation and characteristics from Boardex.[3] We

[2] Please refer to Appendix B for an example of the penalty imposed by the EPA.

[3] We identify the director of each firm and pairs of firms with at least one director in common. Second, we identify events of corporate misconduct from the Violation Tracker file provided by Good Jobs First. This file gathers information on a variety of different corporate violations from U.S. government agencies. Environmental violations are from the Environmental Protection Agency (EPA). Social violation data on management and human relations come from state agencies.

measure environmental and social performance using the CSR KLD scores, now called MSCI ESG scores (see Hong et al. (2019); Flammer (2015)), for a sample of 1,862 US firms in the 2000-2016 period. MSCI (KLD) is the CSR data set with more ample sample coverage (in terms of years and number of companies) and which has been used most frequently in academic studies (Berg, Kolbel and Rigobon (2022); Iliev and Roth (2023)).

We consider three groups of firms and two type of corporate violations. The first set of firms are the ones that committed environmental (or social violations) (*misconduct firms*); the second set of firms are the *interlocked firms* (*treated firms*) that shared at least one director with the *misconduct firm* when the penalty was announced; and the third set of firms are the *control firms*. Focusing on the *interlocked firms* (and the *control firms*), we estimate changes in sustainability performance in the *interlocked* (*treated*) *firms* using a difference-in-differences specification. Our final sample comprise as follows: 484 treated firms for environmental violations (and 527 treated firms for social violations). For each treated firm we identify up to four control firms (in the same industry as the treated firm) employing the Mahalanobis distance matching approach (on the year before the penalty announcement).

Our results show that professional directors support new sustainability initiatives in their interlocked firms after a corporate violation by the misconduct firm, but only for environmental cases. The economic magnitude of our main result is sizable, we find that interlocked firms increase their environmental CSR by in 39% after treatment.

For social violations we do not find evidence that directors help to improve social performance. Existing studies indicate that different environment- and social-related aspects of CSR have a similar effect on corporate performance (Flammer (2015); Servaes and Tamayo (2013); Busch and Fiede (2018)). However, the evidence in our paper points to the fact that directors are more reactive to environmental infringements than to negative social events, which suggests that directors can only influence sustainability policies that directly affect firm's operations. Moreover, another interpretation of the results is that environmental violations might affect different sets of stakeholders who seem to be more important for directors relative to the possible set of stakeholders that could be affected by social violations (Cai et al. (2022)). Finally, consistent with recent evidence regarding the number of directors with environmental and social experience (Tonello 2023), directors have more firsthand experience associated with social issues. Consequently, the importance of social violation is deemed less significant in improving social performance in the interlocked firms.

We also perform different cross-sectional analyses that show that environmental violations that paid higher fines lead to more meaningful environmental improvements in the interlocked firms. In contrast, the impact on environmental performance of the interlocked is not highly associated with the size of the misconduct firm, which suggests that the effect is mainly driven by the penalty imposed by the regulator rather than the importance of the misconduct firm. In general, our view is that more salient corporate events (negative) lead to more meaningful sustainability reforms across interlocked firms, which is consistent

with hypothesis thar directors learn and transfer important knowledge after recent experiences (even bad ones).

In additional cross-sectional analyses, we show that the impact of corporate violations on the environmental performance of interlocked firms depends on director influence. More influential directors enhance CSR performance across these interlocked firms. Furthermore, interlocked firms in polluting industries and with higher institutional investor ownership are the ones more positively affected by the improvement in environmental performance. Importantly, the ability of directors to boost the CSR performance in the interlocked firms also depends on the financial position of those firms. In particular, firms that have more limited resources are less likely to invest in reformulating their CSR strategies, even in the context of corporate violations.

In the final part of our analysis, we show that the increase in the environmental performance of interlocked firms cannot be seen as a greenwashing activity as we find that interlocked firms that increase their environmental performance reduce the number of cases of environmental violations (EPA sanctions) in the future.

Our work is related to the literature that links corporate fraud and CSR. Existing work shows that firms make remedial actions as a response to their reputational damages, associated with the revelation of corporate misconduct (Wilson (2008); Chakravarthy, deHaan, and Rajgopal (2014); Ferres and Marcet (2021)). A different stream of the corporate governance literature shows that more socially responsible firms are less likely to engage in corporate misconduct and, moreover,

that fraud cases by high CSR firms are less severe (Shiu and Yang (2017); Harjoto (2017); Wans (2020)). We contribute to the literature that studies the links between corporate violation and CSR as we analyze whether interlocked reformulated their CSR initiatives after the revelation of a corporate violation (in a related firm) in an attempt to ex-ante develop better links between each firm and their different stakeholders. Our study adds new information on the importance of directors in supporting CSR as CSR might be valuable in mitigating the reputational damage caused by corporate misconduct or avoiding those negative events in the future.

Our work is linked to the study of the impact of boards on the formulation of CSR policies. Existing work suggests that firms with better governance standards such as a larger proportion of independent directors on their boards or the existence of specific board committeees have enhanced CSR policies and socially-related performance (Jo and Harjoto (2011); De Villiers, Naiker and von Staden (2011); Dixon Fowler, Ellstrand and Johnson (2017); Amiraslani, Deller, Ittner and Keusch (2020)). Our contribution to the corporate governance literature is to show that directors who have a better assessment of the costs of corporate violations improve the environmental performance of the other companies in which they are also board members. Importantly, our study sheds light on the analysis of how and when changes in CSR policies do occur. We specifically show that board members exposed to corporate misconduct increase their esteem for the relevance of environmental policies and *thereafter* promote better links with different company stakeholders across their portfolio of directorships.

Our work relates to the analysis of the potential contributions that interlocked directors bring to their corporate boardrooms. Existing work shows that a director's experiences shape the economic performance of a company (Dass, Kini, Nanda, Onal and Wang (2014); Gopalan, Gormley, and Kalda (2021)). Homroy and Slechten (2019) demonstrate that European firms with directors who have board-level experience in committees on sustainable issues exhibit lower greenhouse gas emissions. Chen, De Silva and Slechten (2022) find that a director's past environmental record in other companies affects their current firm's chemical releases. Our results imply that directors transfer their recent experience with corporate violations across their companies and that knowledge leads to new approaches to Corporate Social Responsibility in their other directorships. Our study captures a *dynamic* aspect of the contribution of interlocked directors to their multiple firms because directors continuously acquire experiences and refresh their knowledge based on the different engagements at their interconnected firms.

The remainder of the paper proceeds as follows: In Section 2, we present the data. In Section 3, we discuss the empirical strategy. In Section 4, we present the evidence on the environmental and social performance in interlocked firms following a case of corporate misconduct and provide different robustness and cross-sectional tests. Lastly, we conclude in Section 5.

## 2. Data

We use different kinds of data sets in our empirical analysis. We identify events of corporate misconduct from the Violation Tracker file provided by Good Jobs

First. Violation Tracker is a wide-ranging database on corporate misconduct that covers banking, consumer protection, false claims, the environment, wage & hours, safety, discrimination, price-fixing, and other cases resolved by federal regulatory agencies and all areas of the Justice Department, as well as cases of state attorneys general and selected state and local regulatory agencies. Violation Tracker collects environmental violations investigated by the Environmental Protection Agency (EPA). Social violations data on management and human relations came from state agencies.[4] We set the limit for cases of environmental and social violations at a penalty above one million dollars to identify the misconduct firms and then the treated (interlocked firms). A priori, the reader could think that the one million cutoff seems arbitrary, however the threshold is obtained from the dataset. Figure 1 shows the distribution of the penalties for environmental and social violations from the years 2000-2019. The x-axis represents the amount of the penalty in US dollars (thousands) and the y-axis represent the percentage of cases. The penalties above 1 million dollars are group together in the last bin ($1000 thousands). We can see from the figure that distribution of the penalties is highly left-skewed (close to zero). In other words, most of the penalties have low fines. On the flip side, the penalties above 1 million dollars represent roughly 6% and 5% of the fines associated with environmental (13,262 cases) and social (31,146 cases) violations, respectively. Throughout the

[4] In using the Violation Tracker file, we focus on corporate violations in which the primary offense was classified as an "environmental violation", "employment discrimination", "workplace safety" or "health violation", "labor relations violation" and "employment screening violation".

paper we provide additional tests associated with the size of the penalties to show that with larger fines we obtain stronger results.

Empirically, we use the year of the penalty imposed by the government agency as the year of the *shock*. While we acknowledge that a corporate violation could take place years before the announcement of a sanction, we believe that the time of the revelation of the penalty (associated with corporate misconduct) better identifies the timing of the shock for the treated firms in terms of the costs associated with the corporate violations. Importantly, we provide a test associated with the dynamics of the sustainability improvements and we find that the effect is concentrated after the announcement of the penalty. During the investigation, interlocked firms and their control groups behave in a similar manner.

We measure environmental and social performance using the MSCI ESG dataset developed by a for-profit company (formerly known as the KLD dataset; see Hong et al. (2019) and Flammer (2015)). This MSCI ESG (KLD) data set measures the CSR performance at firm-level, it has a more ample sample coverage (in terms of years and number of companies) and it has been used most frequently in academic studies (Berg, Kolbel and Rigobon (2022); Illiev and Roth (2023)). Importantly, we consider that this dataset is the best one to conduct our analysis as our study is focused on the implementation/improvement of environmental and social initiatives by interlocked directors rather than on the analysis of corporate performance according to specific ESG metrics.

The scores in this dataset capture firm-level CSR initiatives and controversies along the dimensions of community relations, product characteristics, environmental impact, employee relations, workforce diversity, and corporate governance. MSCI ESG (KLD) scans public databases, such as databases on employee strikes and environmental issues, and it uses a team of analysts to measure these and other social responsibility dimensions. For each of the CSR categories, MSCI ESG (KLD) compiles a set of "Performance Indicators/Attributes", divided into CSR Strengths and CSR Concerns. These indicators are based on annual assessments of a firm's CSR performance made from multiple sources, such as company reports, the media, academic and NGO datasets. The variable CSR Score captures the aggregate MSCI ESG (KLD) score, which is the difference of subtracting CSR Concerns from CSR Strengths. However, given that the MSCI ESG (KLD) ratings (Strengths/Concerns) change over the years, we follow Albuquerque et al. (2019) and normalize the CSR Strengths, CSR Concerns and CSR Score to make them comparable over the years and across firms, we do this to calculate the environmental and social performance.[5] After the normalization the CSR metric is bounded between 0 and 1 for CSR Strengths and Concerns; and between -1 and +1 for the CSR Score. Importantly, the normalization of the CSR score allows for an easier interpretation of the economic magnitudes of the importance of interlocked directors on CSR performance. This is because the coefficient estimates capture

[5] We consider the dimensions community relations, employee relations and workforce diversity to calculate the social performance.

an increase in CSR performance while taking into account the relative importance of the strengths and concerns indicators. Hence, an increase in the CSR score can be seen as an improvement in CSR strengths or a reduction in CSR concerns. We independently create scores for the Environmental and Social dimensions.

We use information on director affiliation and director characteristics found in Boardex. We identify the director of each firm every year and pairs of firms with at least one director in common over time. Finally, accounting and financial information is obtained from Compustat. For treated and control firms, we obtain firm financial data from Compustat and excluded financial (SIC 6000-6999) firms. Finally, after merging the different datasets our final sample span the sample period 1996-2016 with 1,862 US firms.

## 3. Empirical Strategy

### 3.1 Overview

Our empirical setting uses the revelation of a case of corporate misconduct (environmental or social violation) as a shock on other firms connected to the firm involved in the corporate violation through common directors. We focus on the year when the penalty was announced because that announcement was public knowledge (the date when the investigation started is sometimes uncertain). We consider that the penalty announcement had an experiential effect on directors, particularly regarding the new knowledge associated with the costs of environmental and social violations.

In Figure 2 we illustrate the empirical setting. We start with the corporate *misconduct firm* and identify the set of firms connected to the *misconduct firm* by common directors (the interlocked firms) during the year of the penalty. We call those firms *treated firms*, and then for each *treated* firm we find a number of *control firms* that are not connected to the corporate *misconduct* firm but who belong to same industry as the *treated firm*.

A priori, interlocked firms can belong either to the same or to a different industry. However, Section 8 of the Clayton Act prohibits that interlocked directors serve in two competing corporations.[6] In our case, we observe that the majority of interlocked firms in our samples belong to different industries (2-Digit SIC code) with respect to the misconduct firms. Since SIC codes can not perfectly identify all the competitors of the firms in our sample, in Table IA-1 of the Internet Appendix we calculate the percentage of violation firm that are in the same industry as the treated firms (interlocked firms). We find that percentage is approximately 6% and 10% for the samples of environmental and social violations, respectively. Thus, our results are mainly driven by interlocked firms in different industries as the violation firms.

Additionally, in Table-IA-1 we also show that both, violation firms and treated firms are spread out in different industries, although, a high number of environmental violations are in industries associated with natural resources.

[6] https://www.ftc.gov/legal-library/browse/federal-register-notices/section-8-clayton-act-revised-jurisdictional-thresholds-interlocking-directorates

### 3.2 Econometric Specification

We examine the association between corporate violations and CSR dynamics in the U.S. firms that shared professional directors with a firm that committed corporate misconduct, using the following model specification:

$$CSR_{i,j,t} = \alpha + \beta_1 \times Interlocked_{it} + \Gamma' X_{i,t-1} + \varphi_i + \mu_{jt} + \epsilon_{i,j,t} \quad (1)$$

The subscript $i$ indexes *treated* and *control* firms, $j$ refers to the industry and $t$ indexes years. Our specification is essentially a difference-in-differences strategy where *Interlocked* is a dummy variable that takes a value of one for treated firms during the years following the announcement of the penalty against a misconduct firm (the firm involved in the corporate violation that is connected to the treated firm by a common director). Our sample is restricted to a window of three years before and after the year of the treatment (i.e., a total of seven years, including the year of the penalty announcement). Our main dependent variables for are the *CSR Strengths*, *CSR Concerns* and *CSR Score* associated with the environmental and social dimension. We calculate the *CSR Strengths*, *Concerns* and *Score* for each dimension separately (environmental and social).

We include a set of controls *X (lagged value)* associated with firm and board characteristics: *Size, Profitability, Tangibility, MTB, Log(Sales), Cash/TA, Div/TA, ROA, Book Leverage, Cash Flow, Innovation, R&D/TA, Firm Age, Board Size, CEO/Chairman Duality (dummy), Gender Ratio, Independent Directors Ratio* and *Board Tenure* (all variables are defined in Appendix A).

Firm-year and industry-year fixed effects are represented by $\varphi_i$ and $\mu_{jt}$, respectively.

In our setting, take into account industry trends is crucial to rule the possibility that the environmental and social violations we consider (above $1 million dollars) can impact firms' decisions in specific industries to improve the CSR performance. This is because firms in specific industries could become aware of the problems and penalties associated with non-compliance with regulatory requirements, which might be substantial, and they would like to avoid these issues by enhancing their environmental and social policies. If this is the case directors would not be driving our results, however, by including industry-year fixed effects we control for that possibility and the effect we find would be driven by the role of interlocked directors rather than industry-wide shocks.

For each case of a corporate violation (environmental and social), we identify the treated and control firms by each type of misconduct (two different subsamples) and we run the analyses independently. We run a first set of analyses to examine the association between environmental violations and environmental CSR performance in the interlocked (treated) firm. Then we run a second set of analyses to examine the association between the occurrence of a corporate event that affected the social standing of a firm (human relations, diversity, human rights) and CSR social initiatives in the interlocked firms that shared professional directors with the misconduct firm.

Because the number of observable dimensions for an average treated firm might differ from the average firm in the Compustat universe, we conduct our tests within a matched sample of treated and observationally similar control firms. Specifically, for every treated firm, we identify up to four control firms that belong in the same 2-Digit SIC industry as the interlocked firm and close to the treated firms in terms of size (total assets), book leverage and ROA in the year immediately prior to the penalty announcement. We use the Mahalanobis distance to identify the closest match and we perform the match with replacement. Using a matched sample reduces the risk of violating the parallel trend assumption because of preexisting differences in the characteristics of treated firms with respect to control firms. Our final sample comprise as follows: 484 treated firms for environmental violations and 527 treated firms for social violations.

The identifying assumptions in this difference-in-differences framework are the parallel trends. We assume that, in the absence of a corporate violation that affects the treated firm trough common directors, the outcome variables for the treated and control firms would trend in parallel, especially in the years before the penalty announcement.[7] Figure 3 shows the unconditional evidence as we plot the average CSR Score (environmental and social) for interlocked and control firms over the seven year of the time window, where *t=0* is the year of the penalty announcement. Figure 3 (a) report the average CSR Score (environmental) for

[7] As we mention in Section 2, we consider that the time of the revelation of the penalty better identifies the timing of the *shock* in terms of experience in corporate violations (even though a corporate infringement can occur years before the announcement of a sanction).

treated and controls firms. For environmental violations the figure shows a clear pattern of an increase in CSR scores for the interlocked firms after the penalty announcement. In contrast, we do not see the same pattern for the control firms where there are no common directors between control firms and the misconduct firms. It is important to notice that we also observe a positive reaction for treated and control firms in the year of the penalty, which is consistent with our previous concerns regarding the effect of a corporate violation across different industries besides the role of directors. Fortunately, the difference between the two groups becomes larger in the following years after the penalty, confirming the parallel trend assumption. Figure 3 (b) shows the average CSR Score for the social dimension, and we find that treated and control firms move in parallel before and after the shock, which suggests a priori that directors do not affect social performance in the interlocked firms after a social violation.

## 4. Results

### 4.1 Corporate Violations and CSR of interlocked firms

Table 1 presents the frequency of environmental and social violations in the two samples. It also highlights that corporate fines for environmental violations are significantly higher than those for social violations, even though the latter occur more frequently.

Table 2 shows the summary statistics on the firms in the two samples: 1354 firms in the sample of environmental violations and 1238 firms in the sample of social violations. Table 2 also shows descriptive statistics on the Corporate Social

Responsibility of the firms in the samples. The measures of CSR Strengths and CSR Concerns are higher for the firms in the social violations sample. On average, firms in the environmental violations sample have the highest CSR Score.

Table 3 reports summary statistics (mean, median, and standard deviation) for the matching variables and measures of CSR for both treated firms and their matched control firms in the year before of the corporate violation. 484 treated firms (870 control firms) are in the environmental violations sample and 527 treated firms (712 control firms) are in the social violations sample. Moreover, for each treated sample we also show the summary statistics for the control firms in the same industry as treated firms and matched on size log(Total Assets), Book Leverage and ROA in the year before the treatment (penalty announcement).

In Table 4 we show the results of our examination of the association between corporate violations by misconduct firms and the CSR performance in the interlocked firms after the infringement revelation. In Panel A of Table 4 we show the results of our analysis of the environmentally related CSR performance of interlocked firms that share professional directors with a firm that committed an environmental violation. In Panel B of Table 4 we show the results of our analysis of the socially related CSR performance of interlocked firms that share professional directors with a firm in which a negative social/employment event occurred.

Panel A shows that directors improves CSR performance in the environmental dimension. The evidence shows that interlocked firms improve their

environmentally related CSR Strengths after the revelation of the environmental violation. Column (1) demonstrates that the coefficient ($\widehat{\beta_1} = 0.016$) associated with our *Interlocked* dummy variable is positive and statistically significant at 1%. Moreover, when firm control variables are included (Column 2), the coefficient ($\widehat{\beta_1} = 0.018$) remained similar, which suggests that the results are not driven by firm characteristics that could be correlated with the probability of being an interlocked firm. We find the same results even after controlling for board characteristics (Column 3). In contrasts, we find that firms do not reduce environmentally related CSR Concerns. Columns (4)-(6) do not show any significant results. Therefore, the improvement in the CSR Score is driven by improvements in CSR Strengths. Columns (7)-(9) show that *Interlocked* is positive and statistically significant, and the coefficients ($\widehat{\beta_1} = 0.016$) are similar even after controlling for firm and board characteristics (Column 6). The economic magnitude of this result is sizable, we find that interlocked firms increase their environmental CSR by in 39% after treatment (calculated as the coefficient of $\widehat{\beta_1} = 0.016$ divided by the average CSR Score of 0.041).

The results in Table 4, Panel B, show that interlocked firms that share professional directors with a firm that experienced a negative social event do not modify their socially related CSR initiatives. Existing studies indicate that different environment- and social-related aspects of CSR have a similar effect on corporate performance (Flammer (2015); Servaes and Tamayo (2013); Busch and Fiede (2018)). However, the evidence in our paper points to the fact that directors are more reactive to environmental infringements than to negative social events,

which suggests that directors can only influence CSR policies that directly affect firm's operations.

Moreover, another interpretation of the results is that environmental violations might affect different sets of stakeholders who seem to be more important for directors relative to the possible set of stakeholders that could be affected by social violations (Cai et al. (2022)). Therefore, our evidence is also consistent with the findings in Amiraslani, Deller, Ittner and Keusch (2020), who examine the impact of board risk oversight on the elements of the CSR scores and find that boards have a more direct impact on environmental issues than on social issues. Finally, consistent with recent evidence regarding the number of directors with environmental and social experience (Tonello 2023), directors have more firsthand experience associated with social issues. Consequently, the importance of social violation is deemed less significant in improving social performance in the interlocked firms.

Existing work indicates that firms that share directors with other firms accused of fraud are more likely to face fraud allegations themselves (Fich and Shivdasani (2007)). It therefore makes sense that directors update their subjective probability of a corporate scandal subsequent to a personal experience with a recent negative corporate event. The results in our study are consistent with the idea that there is a positive spillover effect from corporate violations as interlocked firms improve their CSR policies and promote better relations with different company stakeholders following the revelation of corporate misconduct.

Our interpretation of the results is also consistent with the notion that boards weigh the costs and benefits of investing in CSR and that there is an increase in CSR initiatives because directors revise their beliefs on the probability of a corporate scandal and on the positive implications of CSR as a means to alleviate the implications of negative corporate events. Our evidence is also consistent with the idea that individuals with multiple directorships transfer their experience from one board to another. This implies that overlapping directors propagate corporate policies across firms (see Bouwman (2011)).

Table 5 shows more formally the results of our examination of the parallel trends assumption. The results show that environmental-CSR reforms take place only after the occurrence of an initial environmental violation in an interlocked firm. Columns (1) and (2) show that improvements in environmental CSR Strengths and Score are made during the period after the corporate violation. More specifically, the dummies for the years before the environmental violation are not statistically different from zero. Hence, the behavior of treated and control firms before the shock is similar in terms of CSR Strengths and Score after controlling for firm and board characteristics and industry trends.

In addition, we also test this for the pre-treatment period by examining the difference in trends in outcome variables between treated and control firms before and after the revelation of the corporate violation, year by year. We plot the coefficient associated with the timing of the *Interlocked* dummy, which is represented in the following regression:

$$CSR_{i,j,t} = \alpha + \beta_1^{t=+\tau} \sum_{\tau=+1}^{+3} Interlocked(t=+\tau) + \beta_2^{t=-\tau} \sum_{\tau=-1}^{-3} Pre\ Interlocked_{(t=-\tau)} + \Gamma' X_{i,t-1} + \varphi_i + \mu_{jt} + \epsilon_{i,j,t} \quad (2)$$

Figure 4 Panel A shows that the changes in environmentally related CSR Score in the treated firms (relative to control firms) takes place only after, and not before, the environmental penalty was imposed on the misconduct firm. Figure 4 Panel B shows that no major changes in socially related CSR took place after the year of the penalty. In summary, the graphic evidence suggests that there is a link between the environmental shock and the subsequent environmental improvement in the companies that shared a director with the firms involved in a corporate violation. However, prior to the corporate violation by the misconduct firms, treated and control firms behaved similarly, which supports the parallel trend assumption and our empirical strategy when we employ the year of the penalty as the year of the shock.

Tables 4 and 5 display the negative shock (corporate violations) to directors helps them to promote additional CSR reforms in the same area as the corporate misconduct. However, one valid concern is whether a director will help improve all the CSR dimensions and not just the one associated with the misconduct. If that were the case, the role of directors transmitting valuable environmental or social information/experience after a negative event would be less clear as CSR improvements are not specifically related to negative type of corporate event; and hence, the results could be explained by alternative stories. However, in Table 6, we show that firms that share professional directors with a firm that was involved in an environmental violation do not modify their social and or governance CSR

initiatives after the revelation of the corporate infringement. We also show that firms that share professional directors with a firm that was involved in a negative corporate social event do not modify their environmental or governance CSR dynamics.

Taken together, the results in Tables 4, 5 and 6 are consistent with the experience effect of corporate violations, the results suggest that directors support only new CSR initiatives in the specific areas involved in the corporate violation.

### 4.2 The impact of fines

Table 7 shows the results of our examination of the association between corporate violations and CSR performance in the other directorships of directors after the revelation of the penalty, based on the magnitude of the corporate violation. Columns (1) -(6) in Table 7 Panel A provide the results of our subsample analysis associated with the impact of environmental fines (we employ terciles according to the penalty size) in misconduct firms on the CSR initiatives of the interlocked firms. Columns (7) and (12) in Table 7 show the results of our subsample analysis of the impact of fines in socially related violations on the CSR initiatives of the interlocked firms. The evidence shows that firms that share professional directors with a firm that was fined for their involvement in an environmental violation improve their environmentally-related CSR Scores only when the fines were heavy. The results are consistent with the idea that relevant corporate violation permit to acquirer important knowledge about future environmental risks

associated with firm's operations. Then, directors will support more sizeable CSR initiatives when their firms are impacted by corporate violation of a more substantial magnitude.

The results also show that the CSR Scores of firms that share professional directors with a firm involved in a social violation do not change, not even when a heavy fine was imposed. These results suggest that directors prefer to improve environmental performance after a corporate violation rather than social violations.

One alternative explanation is related to the importance of the violating firm itself rather than the penalty. If this is correct, the improvement in environmental CSR could no longer be solely attributed to the influence of directors, given the new experience with environmental issues. The increase in CSR would then be explained by a shock to the industry, especially if the misconduct firm is a significant player in a specific industry. To reduce the concerns regarding the alternative story, we do the same split as in the size of the penalty, but we use the size of the violation firm. Panel B of Table 7 shows that the effect on CSR of the interlocked firms seems to be unrelated to the size of the violation firms (please see Columns (1)-(6) associated for environmental violations). We have a positive effect on CSR (mainly in strengths) for small and big firms.

In Table 7 of Panel C, we run our baseline equation in four groups: 1) bottom tercile in terms of the penalty and firm size, 2) bottom tercile in terms of the penalty and top tercile in firm size, 3) top tercile in terms of the penalty and

bottom tercile in firm size and 4) top tercile in both, penalty and firm size. The results suggest that the penalty of the violation firms affect more the CSR in the interlocked firms as we find that the coefficient associated with Interlocked is positive and statistically significant (at 5% level) in the groups of high fines regardless the size of the violation firm. In addition, we find that the stronger effect is obtained in the group of high fines and small firms. Moreover, we find that for the group of low fines and small firms we find no significant results.

Finally, Figure 5 shows the CSR dynamics (environmental violations) of two group of firms according to penalty size (low fines: bottom tercile and high fines: medium and top tercile). We find the CSR reaction after the penalty is positive and statistically significant for the group of high fines. For the group of low fines, we do not find any reaction after the fines, the coefficient are very similar in magnitude as the ones before the penalty, which suggest that our results are mainly driven by the cost of the corporate violation.

### 4.3 Director influence

In Table 8, we test whether our baseline results would be different depending on the specific director characteristics. The intuition is that there is heterogeneity in the ability of different directors to promote sustainability changes in their interlocked firms, and we show that certain individual director characteristics are associated with a more direct link between corporate misconduct and sustainability reforms in the interlocked firms.

Our subsample analysis suggests that more experienced directors (in terms of tenure) are the ones driving the improvement in CSR in their interlocked firms after the revelation of environmental controversies. Specifically, we find that the coefficient associated with the *Interlocked* variable is higher and statistically significant in interlocked firms with common directors who have a longer tenure (above sample median) in the treated firms (see Column 1 and 2).

Our subsample analysis also shows that directors who are on a higher number of boards improve the CSR performance. Specifically, we find that the coefficient associated with the *Interlocked* variable is higher and statistically significant in interlocked firms with common directors who have more boards in the treated firms (see Column 3 and 4). Our interpretation of this result is that directors who are more exposed to a wider variety of corporate and personal experiences have more influence in promoting specific CSR changes in all their directorships following a personal experience with a corporate violation. Interestingly, we do not find different results when we split the sample according to board size, which suggests that the directors affect environmental performance regardless of the board's size (see columns 5 and 6).

We also perform two additional splits that could affect the influence of directors on improving CSR after an environmental violation. First, we consider the institutional investor ownership. Previous literature has shown the positive effect of long-term investors on CSR performance (Nguyen et al., 2020) and directors could leverage institutional investor ownership to improve the environmental performance following a corporate violation. Our results are in line with previous

conjecture as we find that in firms with a higher level of institutional investor ownership (above the sample median), we find a positive effect of directors on interlocked firms' CSR performance (see columns 7 and 8).

The next split is associated with the classification of industries as polluting and non-polluting. We follow Berrone et al (2013) to classify polluting industries using the SIC codes. We expect that directors of interlocked firms operating in polluting industries have more influence as they can better convey the costs associated with not having environmental initiatives consistent with regulations imposed by the EPA. We find consistent results, the impact of common directors is significant only in polluting industries, although the size of the coefficient in non-polluting industries is similar to polluting industries (see columns 9 and 10).

The evidence in Table 8 is important, as it suggests that not all professional directors add the same kind of value to the board. We also provide evidence that there is heterogeneity in the ability of more experienced and better-connected directors to support CSR changes within their boards. Additionally, we offer further evidence on the role of institutional investors in helping directors improve CSR performance. Finally, our results indicate that firms with greater environmental risk exposure are more receptive to changes in CSR driven by directors' new experiences.

### 4.4 Financial considerations

Table 9 shows that the impact of corporate violations on the CSR dynamics in interlocked firms also depend on their specific financial characteristics. Even

though we find that interlocked firms increase their CSR efforts because of director's influence, new sustainability policies are costly, so we conjecture that some firms might not have resources available to improve their CSR Strengths/Score even though the directors might be willing to adopt new sustainability strategies. Our subsample analysis indicates that firms whose resources are more limited are less likely to invest in reformulating their CSR strategies, even in the context of a corporate violation. On the contrary, we find that more liquid firms implement new environmental CSR initiatives subsequent to the occurrence of an environmental controversy in an interlocked firm. Specifically, we find that the coefficient associated with the *Interlocked* variable is higher and statistically significant in interlocked firms with higher levels of operating cash flows and cash and equivalents.

### 4.5 Future environmental impact

In this last section, we test whether interlocked firms that enhance their sustainability initiatives following a revelation of corporate misconduct in an interconnected firm establish better relationships with their stakeholders, for example, in terms of environmental standards. Specifically, we test the relationship between CSR and the environmental performance of the treated firms relative to control firms using the number of environmental violations with fines below $1 million.[8] To do so, we run the following regression:

[8] We consider fines below $1 million because firms with environmental violations with penalties above that figure are identified as *misconduct* firms and they are not part of the control group,

$$NEnv_{ijt} = \alpha + \beta_1 CSR_{i,j,t} \times Interlocked_{it} + \beta_2 CSR_{i,j,t} + \beta_3 Interlocked_{it} + \Gamma' X_{i,t-1} + \varphi_i + \mu_{jt} + \epsilon_{i,j,t} \quad (3)$$

In Equation (3) we follow the same empirical design of our baseline tests, but now the dependent variable $NEnv_{ijt}$ refers to the number of environmental violations where fines were below $1 million for firm *i*, in year *t* and industry *j*.[9] In this case, we are interested in the coefficient $\beta_1$, which is associated with the interaction term $CSR \times Interlocked$, and we expect to be negative. Intuitively, our prior is that interlocked firms that increase their environmental CSR efforts have fewer cases of environmental violations relative to the control firms in the years after the shock. Table 10 shows the results, and the coefficient for the interaction term $CSR \times Interlocked$ is negative. Column (1) shows that the coefficient $\beta_1$ has the expected sign (negative), yet statistically significant at 10%. These results suggest that the increase in CSR efforts does not reduce other environmental violations right after the revealed environmental violation (window period: [-3,+1]). The meaningful reduction takes more than one year to take place. Columns (2) and (4) show that the interaction term is negative and statistically significant, which suggests that one year after the environmental shock, CSR initiatives help improve the environmental performance of interlocked firms (window period: [-3,+2] and [-3,+3]). Finally, and consistent with the results in Table 9, columns (5) and (6) shows that the interaction term $CSR \times Interlocked$ is negative and

by construction. We do not provide results for social violations as we do not find results (baseline) for social violations.

[9] Cai et al. (2022) use the same empirical setting and dependent variable to account for future violations. However, they focus on future violations of the corporate misconduct firm. In our case we are interested in the role of CSR of the interlocked firms to prevent future violations.

statistically significant only in firms with higher levels of cash flows, which suggests that the improvement in CSR Strengths in the environmental dimension is costly, but it pays off as interlocked firms are able to improve their environmental performance.

## 5. Conclusions

Our study contributes new insights to the analysis of the relationship between corporate misconduct and corporate sustainability. While existing research indicates that firms often take remedial actions in response to reputational damage caused by corporate misconduct, and that CSR initiatives can mitigate the costs of such events, our findings highlight the influence of personal experiences with corporate violations on directors' views regarding the probability and costs of such negative events. This, in turn, incentivizes them to implement corporate sustainability policies in their interlocked firms.

To the best of our knowledge, we present the first empirical study to directly link the impact of environmental violations in one firm to changes in environmental performance (measured as CSR) in other interlocked firms, driven by interlocked directors.

Our results also suggest that the ability of interlocked firms to promote corporate sustainability strategies depends on their financial position, as firms with more limited resources are less likely to invest in reformulating their sustainability strategies, even in the context of corporate violations. Additionally, we find that more influential directors can lead the implementation of sustainable policies.

Finally, we find that interlocked firms that improve their environmental performance following the revelation of a corporate violation in an interconnected firm are less likely to incur future environmental violations. This last evidence is not consistent with a greenwashing behavior.

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**Figure 1: Total Distribution of the Penalties**

These figures provide the distribution of the penalties according to their value for environmental and social violations. The x-axis represents the amount of the penalty in US dollars (thousands). The penalties above 1 million dollars are grouped together in the last bin ($1000 thousands).

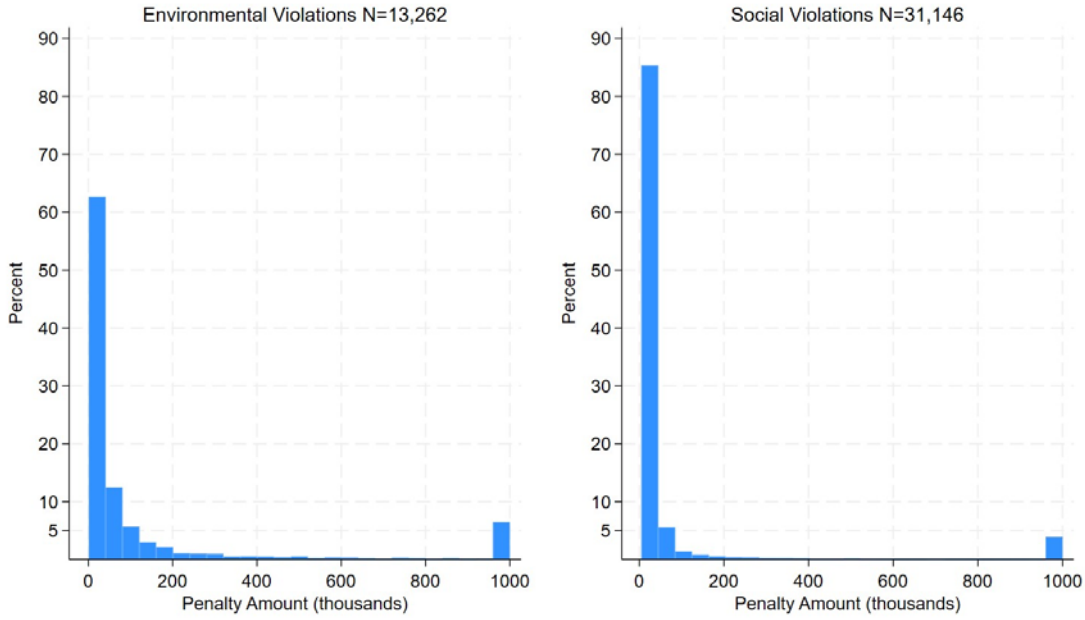
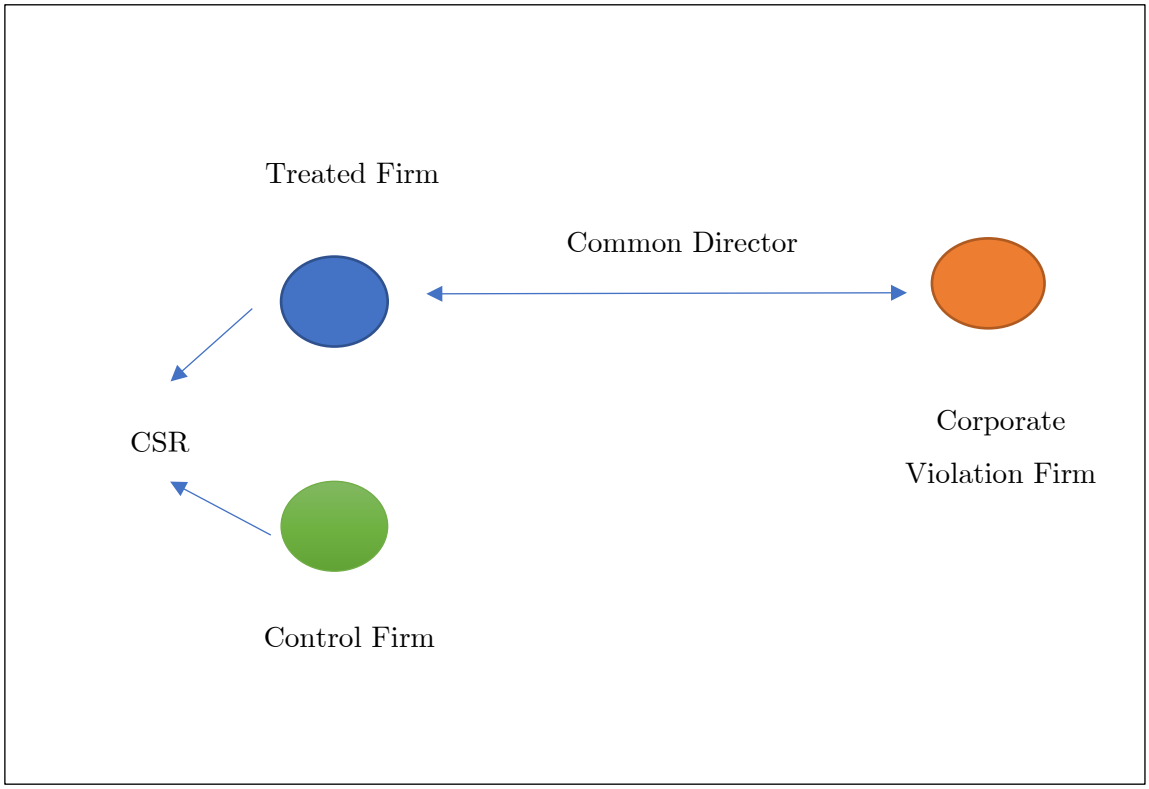


**Figure 2: Empirical Setting**



## Figure 3: Parallel Trends

The graphs show the average environmental and social score for treated and control firms in event time. The horizontal axis represents time in years relative to penalty announcement while the vertical axis represents the averages of the outcome variable.

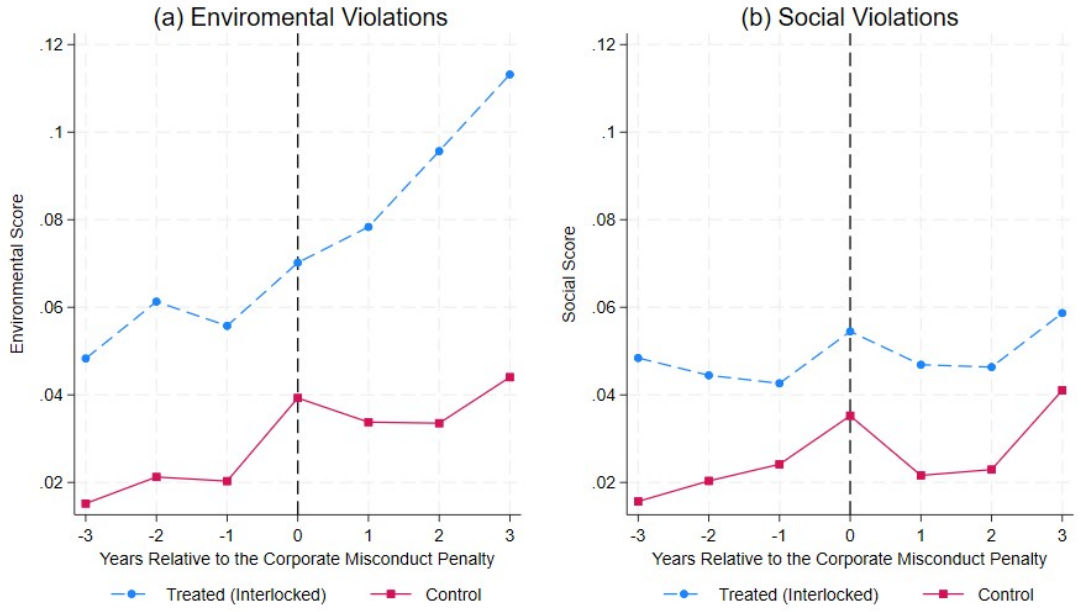


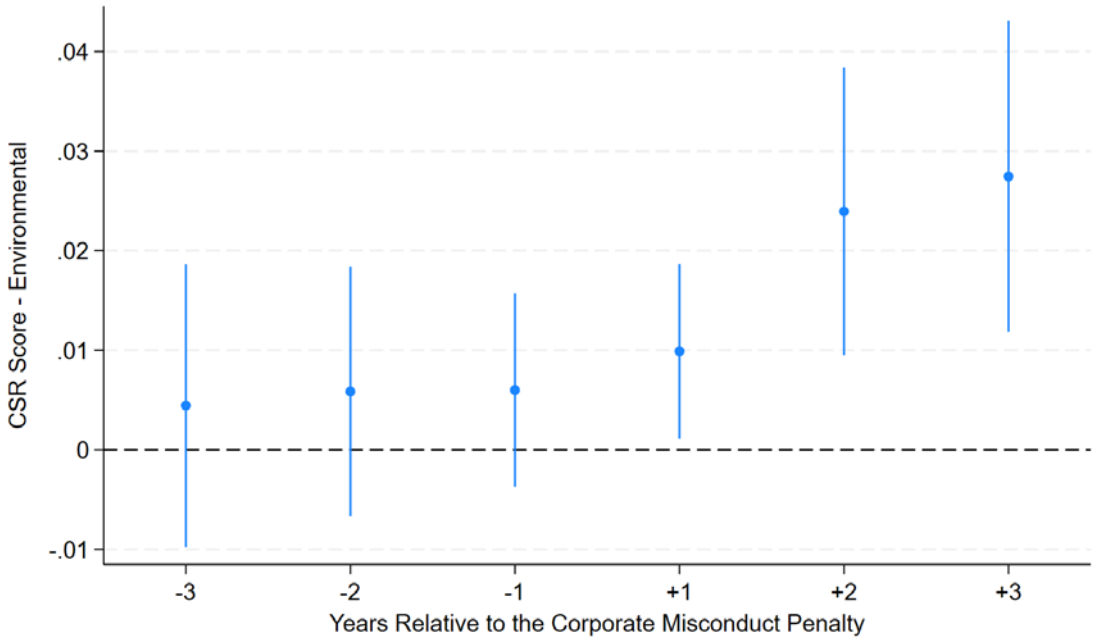
**Figure 4: CSR Dynamics**

Timing of CSR. Panel A plots the coefficients for the dynamic difference-in-differences regressions that estimate the effect of an environmental violation of an interlocked firm on CSR. Panel B considers social violations. The horizontal axis represents time in years relative to the event of corporate misconduct (year of the penalty) while the vertical axis represents the estimates. Each point corresponds to the difference in CSR Strengths (Environmental, Social and Corporate Governance) of interlocked (treated) firms relative to control firms in each year. The specification includes the firm-level controls, firm fixed effects and industry-year fixed effects:

$$CSR_{i,j,t} = \alpha + \beta_1^{t=+\tau} \sum_{\tau=+1}^{+3} Interlocked(t=+\tau) + \beta_2^{t=-\tau} \sum_{\tau=-1}^{-3} Pre\_Interlocked(t=-\tau) + \Gamma' X_{i,t-1} + \varphi_i + \mu_{jt} + \epsilon_{i,j,t}$$

*Interlocked (Pre_ Interlocked)* is a dummy variable that takes a value of one for firms that share a director with a firm that has been affected by a corporate misconduct in the year $\tau$ after (prior) the event. $X_{i,t}$ represents a vector of control variables that include the lag of size, profitability, tangibility, market-to-book ratio, log(sales), cash and equivalents divided by the book value of assets, ROA, book leverage, cash flow to assets, innovation, R&D to total assets, firm age, the CEO/Chairman dummy, gender ratio, independent director ratio, board size and board tenure. $\varphi_i$ represents firm fixed effects and $\mu_{jt}$ represents industry-year fixed effects. Standard errors are clustered at the firm level and the coefficients are plotted with a 90% confidence of interval. All variables are defined in Appendix A.

Panel A : Environmental Violations



Panel B : Social Violations

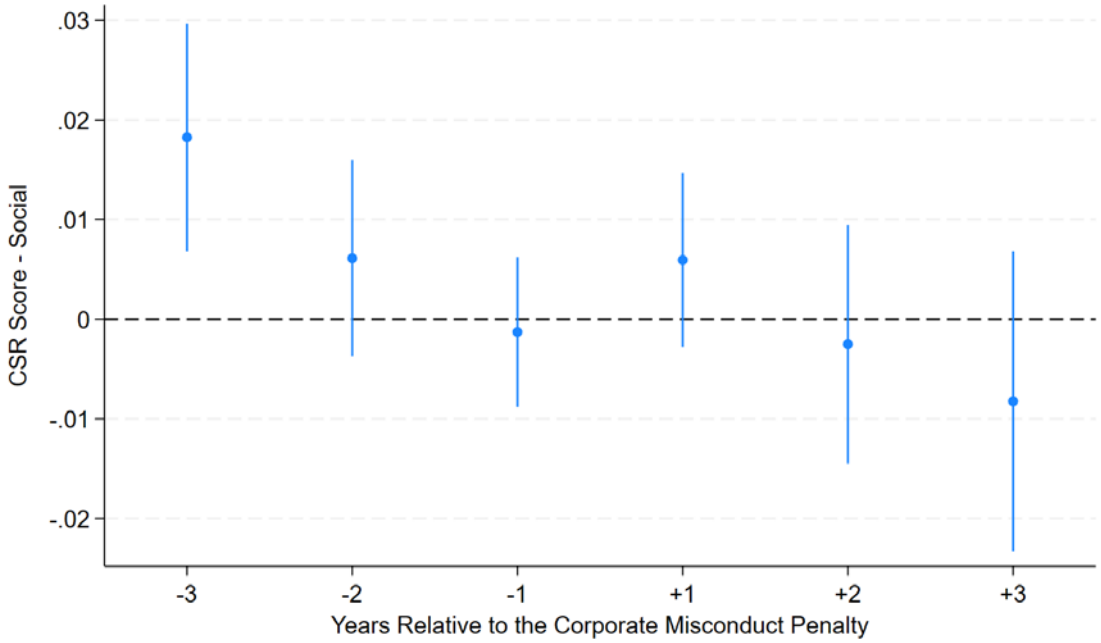


**Figure 5: CSR Dynamics - Low vs. High Penalties**

Timing of CSR. This figure plots the coefficients for the dynamic difference-in-differences regressions that estimate the effect of an environmental violation of an interlocked firm on CSR. We split the sample in two: high vs low penalties. The horizontal axis represents time in years relative to the event of corporate misconduct (year of the penalty) while the vertical axis represents the estimates. Each point corresponds to the difference in CSR Score (environmental) of interlocked (treated) firms relative to control firms in each year. The specification includes the firm-level controls, firm fixed effects and industry-year fixed effects:

$$CSR_{i,j,t} = \alpha + \beta_1^{t=+\tau} \sum_{\tau=+1}^{+3} Interlocked(t=+\tau) + \beta_2^{t=-\tau} \sum_{\tau=-1}^{-3} Pre\_Interlocked(t=-\tau) + \Gamma' X_{i,t-1} + \varphi_i + \mu_{jt} + \epsilon_{i,j,t}$$

*Interlocked (Pre_ Interlocked)* is a dummy variable that takes a value of one for firms that share a director with a firm that has been affected by a corporate misconduct in the year $\tau$ after (prior) the event. $X_{i,t}$ represents a vector of control variables that include the lag of size, profitability, tangibility, market-to-book ratio, log(sales), cash and equivalents divided by the book value of assets, ROA, book leverage, cash flow to assets, innovation, R&D to total assets, firm age , the CEO/Chairman dummy, gender ratio, independent director ratio, board size and board tenure. $\varphi_i$ represents firm fixed effects and $\mu_{jt}$ represents industry-year fixed effects. Standard errors are clustered at the firm level and the coefficients are plotted with a 90% confidence of interval. All variables are defined in Appendix A.

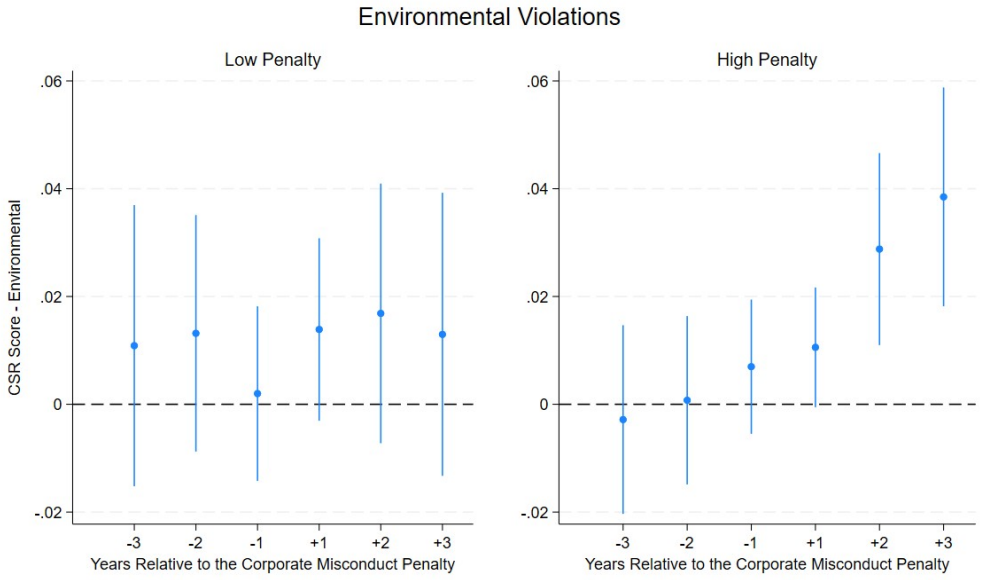


**Table 1: Corporate Violations**

This table reports the summary statistics of the corporate violation events (Panel A) and the distribution of the events by year (Panel B).

| Panel A: Summary Statistics | | |
|---|---|---|
| Violation: | Environmental | Social |
| Number of Events | 481 | 727 |
| Number of Firms | 249 | 406 |
| Mean Penalty ($M) | 69.92 | 11.98 |
| Min Penalty ($M) | 1.00 | 1.00 |
| Penalty ($M) P25 | 1.80 | 1.96 |
| Median ($M) | 4.10 | 4.20 |
| Penalty ($M) P75 | 17.5 | 10.00 |
| Max Penalty (M$) | 5150 | 640 |
| Panel B: Frequency of the corporate violations by year | | |
| Violation: | Environmental | Social |
| 2000 | 16 | 14 |
| 2001 | 20 | 23 |
| 2002 | 26 | 24 |
| 2003 | 26 | 18 |
| 2004 | 19 | 27 |
| 2005 | 21 | 34 |
| 2006 | 27 | 42 |
| 2007 | 32 | 42 |
| 2008 | 35 | 45 |
| 2009 | 21 | 55 |
| 2010 | 37 | 51 |
| 2011 | 26 | 62 |
| 2012 | 32 | 53 |
| 2013 | 39 | 44 |
| 2014 | 36 | 49 |
| 2015 | 36 | 65 |
| 2016 | 32 | 79 |

**Table 2: Summary Statistics**

This table reports summary statistics for the firms in the samples of environmental and social violations. All variables are defined in Appendix A.

| | Environmental Violations | | | | Social Violation | | | |
|---|---|---|---|---|---|---|---|---|
| | Mean | Median | SD | N | Mean | Median | SD | N |
| CSR Strengths | 0.091 | 0 | 0.175 | 12891 | 0.1 | 0.042 | 0.143 | 10824 |
| CSR Concerns | 0.051 | 0 | 0.116 | 12891 | 0.067 | 0.062 | 0.079 | 10824 |
| CSR Score | 0.041 | 0 | 0.192 | 12891 | 0.033 | 0 | 0.166 | 10824 |
| *Size* | 8.056 | 8.016 | 1.492 | 12891 | 7.917 | 7.864 | 1.57 | 10824 |
| *Book Leverage* | 0.243 | 0.237 | 0.19 | 12891 | 0.23 | 0.22 | 0.197 | 10824 |
| *Profitability* | 0.127 | 0.125 | 0.112 | 12891 | 0.123 | 0.121 | 0.102 | 10824 |
| *Tangibility* | 0.287 | 0.201 | 0.241 | 12891 | 0.262 | 0.174 | 0.237 | 10824 |
| *MTB* | 1.792 | 1.283 | 1.641 | 12891 | 1.781 | 1.304 | 1.49 | 10824 |
| *Log(Sales)* | 7.695 | 7.796 | 1.558 | 12891 | 7.543 | 7.618 | 1.593 | 10824 |
| *Cash/TA* | 0.162 | 0.089 | 0.187 | 12891 | 0.175 | 0.106 | 0.189 | 10824 |
| *Div/TA* | 0.013 | 0.005 | 0.023 | 12891 | 0.012 | 0.002 | 0.022 | 10824 |
| *ROA* | 0.04 | 0.047 | 0.113 | 12891 | 0.04 | 0.047 | 0.108 | 10824 |
| *CashFlow* | 0.081 | 0.086 | 0.114 | 12891 | 0.078 | 0.083 | 0.108 | 10824 |
| *Innovation* | 0.209 | 0.152 | 0.201 | 12891 | 0.22 | 0.167 | 0.21 | 10824 |
| *R&D/TA* | 0.037 | 0.003 | 0.074 | 12891 | 0.04 | 0.009 | 0.07 | 10824 |
| *Firm Age* | 28.441 | 23 | 18.501 | 12891 | 27.74 | 22 | 18.834 | 10824 |
| *CEO/Chairman* | 0.533 | 1 | 0.499 | 12891 | 0.518 | 1 | 0.5 | 10824 |
| *Gender Ratio* | 0.874 | 0.875 | 0.097 | 12891 | 0.874 | 0.875 | 0.099 | 10824 |
| *Ind, Dir. Ratio* | 0.701 | 0.727 | 0.13 | 12891 | 0.703 | 0.727 | 0.128 | 10824 |
| *Log Board Tenure* | 2.011 | 2.08 | 0.522 | 12891 | 1.977 | 2.047 | 0.541 | 10824 |
| *Log Board Size* | 2.224 | 2.197 | 0.239 | 12891 | 2.204 | 2.197 | 0.237 | 10824 |

**Table 3: Summary statistics and comparison of treated and matched control firms**

This table reports summary statistics (mean, median, and standard deviation) for the matching variables and measures of CSR for both treated firms and their matched controls in the year before of the corporate violation. The environmental violation sample is comprised of 484 treated firms and the social violation sample of 527 treated firms; and as many as four control firms matched on industry, Log(Total Assets), Book Leverage and ROA for the year of the treatment. The last column reports the median test between treated and control firms. All variables are defined in Appendix A.

| **Panel A: Environmental Violation:** | Treated (Interlocked) | | | | Control | | | | Median Test |
|---|---|---|---|---|---|---|---|---|---|
| | Mean | Median | SD | N | Mean | Median | SD | N | p-value |
| Matching variables: | | | | | | | | | |
| *Size* | 8.330 | 8.233 | 1.624 | 613 | 8.003 | 8.045 | 1.493 | 1906 | 0.112 |
| *Book Leverage* | 0.251 | 0.238 | 0.216 | 613 | 0.244 | 0.241 | 0.181 | 1906 | 0.789 |
| *ROA* | 0.036 | 0.045 | 0.111 | 613 | 0.036 | 0.043 | 0.114 | 1906 | 0.570 |
| Outcome variables: | | | | | | | | | |
| *CSR Strengths* | 0.129 | 0.000 | 0.211 | 613 | 0.076 | 0.000 | 0.156 | 1906 | 0.000 |
| *CSR Concerns* | 0.058 | 0.000 | 0.120 | 613 | 0.038 | 0.000 | 0.100 | 1906 | 0.000 |
| *CSR Score* | 0.070 | 0.000 | 0.218 | 613 | 0.039 | 0.000 | 0.174 | 1906 | 0.002 |
| **Panel B: Social Violation** | Treated (Interlocked) | | | | Control | | | | Median Test |
| | Mean | Median | SD | N | Mean | Median | SD | N | p-value |
| Matching variables: | | | | | | | | | |
| *Size* | 8.060 | 7.980 | 1.634 | 619 | 7.844 | 7.831 | 1.598 | 1584 | 0.229 |
| *Book Leverage* | 0.249 | 0.231 | 0.220 | 619 | 0.229 | 0.213 | 0.199 | 1584 | 0.180 |
| *ROA* | 0.040 | 0.049 | 0.104 | 619 | 0.031 | 0.044 | 0.124 | 1584 | 0.104 |
| Outcome variables: | | | | | | | | | |
| *CSR Strengths* | 0.119 | 0.042 | 0.163 | 619 | 0.096 | 0.042 | 0.143 | 1584 | 0.159 |
| *CSR Concerns* | 0.065 | 0.063 | 0.079 | 619 | 0.061 | 0.063 | 0.077 | 1584 | 0.718 |
| *CSR Score* | 0.054 | 0.000 | 0.182 | 619 | 0.035 | 0.000 | 0.170 | 1584 | 0.154 |

**Table 4: Interlocking, corporate violations and sustainability performance**

This table reports the results from difference-in-differences regressions that estimate the effect on the CSR of interlocked firms after of a corporate violation. We estimate Equation (1) for CSR Strengths, CSR Concerns and CSR Score:

$$CSR_{i,j,t} = \alpha + \beta_1 \times Interlocked_{it} + \Gamma' X_{i,t-1} + \varphi_i + \mu_{jt} + \epsilon_{i,j,t}$$

*Interlocked* is a dummy variable that takes a value of one for firms that share a director with a firm that has been affected by a corporate misconduct in the year $\tau$ after (prior) the event. $X_{i,t}$ represents a vector of control variables that include the lag of size, profitability, tangibility, market-to-book ratio, log(sales), cash and equivalents divided by the book value of assets, ROA, book leverage, cash flow to assets, innovation, R&D to total assets, firm age, the CEO/Chairman dummy, gender ratio, independent director ratio, board size and board tenure. $\varphi_i$ represents firm fixed effects and $\mu_{jt}$ represents industry-year fixed effects. Standard errors are clustered at the firm level and they are reported in parentheses. *, **, and *** represent significance at the 10%, 5%, and 1% level, respectively. All variables are defined in Appendix A.

Panel A: Environmental Violations

| Environmental: | Strengths | | | Concerns | | | Score | | |
|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| *Interlocked* | .016*** | .018*** | .018*** | .001 | .0006 | .0009 | .014** | .016** | .016** |
| | (.006) | (.006) | (.006) | (.003) | (.003) | (.003) | (.007) | (.006) | (.007) |
| *Size* | | -.010 | -.010 | | .005 | .006 | | -.015 | -.017 |
| | | (.010) | (.010) | | (.006) | (.007) | | (.012) | (.012) |
| *Book Leverage* | | .052* | .051** | | -.011 | -.010 | | .063** | .061** |
| | | (.027) | (.026) | | (.013) | (.013) | | (.029) | (.028) |
| *Profitability* | | -.014 | -.014 | | -.017 | -.017 | | .011 | .012 |
| | | (.036) | (.036) | | (.020) | (.020) | | (.043) | (.043) |
| *Tangibility* | | -.050 | -.051 | | -.061 | -.055 | | -.031 | -.037 |
| | | (.058) | (.057) | | (.054) | (.054) | | (.081) | (.081) |
| *MTB* | | -.004** | -.004** | | .0007 | .0005 | | -.005** | -.005** |
| | | (.002) | (.002) | | (.0008) | (.0008) | | (.002) | (.002) |
| *Log(Sales)* | | .004 | .003 | | .009** | .009** | | -.006 | -.006 |
| | | (.007) | (.007) | | (.004) | (.004) | | (.007) | (.007) |
| *Cash/TA* | | -.003 | -.004 | | -.001 | .0007 | | -.011 | -.013 |
| | | (.035) | (.035) | | (.019) | (.020) | | (.040) | (.040) |
| *Div/TA* | | .286 | .289 | | .107* | .093 | | .172 | .186 |
| | | (.180) | (.179) | | (.057) | (.057) | | (.158) | (.156) |
| *ROA* | | .033 | .033 | | -.148 | -.139 | | .139 | .131 |
| | | (.128) | (.128) | | (.103) | (.102) | | (.164) | (.164) |
| *CashFlow* | | -.016 | -.016 | | .142 | .132 | | -.120 | -.112 |
| | | (.131) | (.132) | | (.106) | (.104) | | (.169) | (.168) |
| *Innovation* | | -.017 | -.016 | | -.029 | -.029 | | .007 | .008 |
| | | (.044) | (.044) | | (.019) | (.019) | | (.051) | (.051) |
| *R&D/TA* | | -.015 | -.018 | | -.016 | -.015 | | .003 | -.002 |
| | | (.053) | (.053) | | (.022) | (.021) | | (.058) | (.058) |
| *Firm Age* | | -.016** | -.017** | | .011*** | .011*** | | -.027*** | -.028*** |
| | | (.008) | (.008) | | (.004) | (.004) | | (.007) | (.007) |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *CEO/Chairman* | | | 6.49e- | | | .002 | | | -.002 |
| | | | (.007) | | | (.005) | | | (.008) |
| *Gender Ratio* | | | -.015 | | | -.038 | | | .006 |
| | | | (.053) | | | (.026) | | | (.057) |
| *Ind, Dir. Ratio* | | | -.016 | | | -.028 | | | .013 |
| | | | (.030) | | | (.025) | | | (.034) |
| *Log Board Tenure* | | | .012 | | | -.007 | | | .017 |
| | | | (.011) | | | (.010) | | | (.014) |
| *Log Board Size* | | | .001 | | | -.009 | | | .007 |
| | | | (.022) | | | (.013) | | | (.023) |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry-Year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Obs. | 12891 | 12891 | 12891 | 12891 | 12891 | 12891 | 12891 | 12891 | 12891 |
| $R^2$ | .707 | .712 | .712 | .802 | .807 | .807 | .689 | .698 | .698 |

Panel B: Social Violations

| Social: | Strengths | | | Concerns | | | Score | | |
|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| *Interlocked* | -.004 | -.003 | -.003 | .004 | .004 | .005 | -.008 | -.007 | -.008 |
| | (.005) | (.005) | (.005) | (.003) | (.003) | (.003) | (.006) | (.006) | (.006) |
| *Size* | | -.005 | -.004 | | .009 | .010 | | -.012 | -.012 |
| | | (.013) | (.012) | | (.006) | (.006) | | (.015) | (.014) |
| *Book Leverage* | | .036 | .034 | | -.007 | -.006 | | .040* | .037 |
| | | (.022) | (.022) | | (.011) | (.011) | | (.024) | (.023) |
| *Profitability* | | .027 | .026 | | -.003 | -.005 | | .028 | .029 |
| | | (.038) | (.037) | | (.022) | (.021) | | (.044) | (.043) |
| *Tangibility* | | .130* | .130* | | -.026 | -.027 | | .156* | .157* |
| | | (.076) | (.077) | | (.031) | (.030) | | (.085) | (.087) |
| *MTB* | | .001 | .001 | | .001 | .001 | | .0002 | -.0002 |
| | | (.002) | (.002) | | (.0009) | (.0009) | | (.002) | (.002) |
| *Log(Sales)* | | .021* | .021* | | -.004 | -.003 | | .025* | .024* |
| | | (.012) | (.012) | | (.005) | (.005) | | (.014) | (.014) |
| *Cash/TA* | | .038 | .039 | | -.004 | -.007 | | .044 | .048 |
| | | (.036) | (.035) | | (.021) | (.021) | | (.045) | (.043) |
| *Div/TA* | | .004 | -.007 | | .088* | .085* | | -.088 | -.096 |
| | | (.093) | (.093) | | (.051) | (.049) | | (.103) | (.101) |
| *ROA* | | .454* | .466** | | -.264** | -.260** | | .699** | .709** |
| | | (.234) | (.238) | | (.117) | (.116) | | (.286) | (.289) |
| *CashFlow* | | -.465* | -.480** | | .269** | .267** | | -.715** | -.729** |
| | | (.239) | (.242) | | (.120) | (.119) | | (.293) | (.295) |
| *Innovation* | | .041 | .041 | | -.003 | -.007 | | .043 | .047 |
| | | (.041) | (.040) | | (.021) | (.021) | | (.048) | (.046) |
| *R&D/TA* | | .020 | .016 | | -.009 | .002 | | .037 | .022 |
| | | (.058) | (.057) | | (.025) | (.025) | | (.063) | (.062) |
| *Firm Age* | | -.009* | -.009* | | .007*** | .008*** | | -.016*** | -.017*** |
| | | (.005) | (.005) | | (.002) | (.002) | | (.006) | (.006) |
| *CEO/Chairman* | | | .002 | | | .005 | | | -.002 |
| | | | (.006) | | | (.004) | | | (.007) |
| *Gender Ratio* | | | -.165*** | | | .089*** | | | -.249*** |
| | | | (.044) | | | (.024) | | | (.051) |
| *Ind, Dir. Ratio* | | | .010 | | | -.014 | | | .025 |
| | | | (.027) | | | (.016) | | | (.034) |
| *Log Board* | | | -.003 | | | -.008 | | | .003 |
| | | | (.008) | | | (.005) | | | (.009) |
| *Log Board Size* | | | -.001 | | | -.017 | | | .014 |
| | | | (.022) | | | (.011) | | | (.024) |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry-Year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Obs. | 10824 | 10824 | 10824 | 10824 | 10824 | 10824 | 10824 | 10824 | 10824 |
| $R^2$ | .73 | .733 | .735 | .698 | .702 | .705 | .714 | .719 | .723 |

## Table 5: CSR Dynamics

This table reports the timing of the effect on the CSR of interlocked firms after of a corporate violation. We estimate Equation (2) for CSR Strengths, CSR Concerns and CSR Score with respect to the environmental and social dimension:

$$CSR_{i,j,t} = \alpha + \beta_1 \times Interlocked_{it} + \beta_2^{t=-\tau} \sum_{\tau=-1}^{-3} Pre\_Interlocked(t=-\tau) + \Gamma' X_{i,t-1} + \varphi_i + \mu_{jt} + \epsilon_{i,j,t} \quad (2)$$

*Interlocked* is a dummy variable that takes a value of one for firms that share a director with a firm that has been affected by corporate misconduct for three years after the event. *Pre_Interlocked* is a dummy variable that takes the value of one for firms that share a director with the penalized firm in the year t prior to the event. $X_{i.t}$ represents a vector of control variables that include the lag of size, profitability, tangibility, market-to-book ratio, log(sales), cash and equivalents divided by the book value of assets, ROA, book leverage, cash flow to assets, innovation, R&D to total assets, firm age, the CEO/Chairman dummy, gender ratio, independent director ratio, board size and board tenure. $\varphi_i$ represents firm fixed effects and $\mu_{jt}$ represents industry-year fixed effects. Standard errors are clustered at the firm level and they are reported in parentheses. *, **, and *** represent significance at the 10%, 5%, and 1% level, respectively. All variables are defined in Appendix A.

| | Environmental Violation | | Social Violation | |
|---|---|---|---|---|
| CSR: | Strengths | Score | Strengths | Score |
| | (1) | (2) | (3) | (4) |
| *Pre_Interlocked (t=-3)* | .009 | .004 | .012** | .019*** |
| | (.008) | (.009) | (.006) | (.007) |
| *Pre_Interlocked (t=-2)* | .007 | .007 | .0005 | .006 |
| | (.007) | (.008) | (.005) | (.006) |
| *Pre_Interlocked (t=-1)* | .005 | .008 | -.003 | -.0003 |
| | (.006) | (.006) | (.004) | (.005) |
| *Interlocked* | .022*** | .020*** | -.002 | -.003 |
| | (.006) | (.007) | (.005) | (.006) |
| Control Variables | Yes | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes | Yes |
| Industry-Year FE | Yes | Yes | Yes | Yes |
| Obs. | 12891 | 12891 | 10824 | 10824 |
| $R^2$ | .712 | .699 | .736 | .723 |

## Table 6: CSR Dimensions

This table reports the results from difference-in-differences regressions that estimate the effect on the CSR of interlocked firms after of a corporate violation (different from the dimension related to the corporate violation). We estimate the following equation for CSR Strengths and CSR Score with respect to the other dimensions besides the one associated with the environmental violation:

$$CSR_{i,j,t} = \alpha + \beta_1 \times Interlocked_{it} + \Gamma' X_{i,j,t-1} + \varphi_i + \mu_{jt} + \epsilon_{i,j,t}$$

We use the other CSR dimensions (social and corporate governance) for the interlocked firms that are connected by a director in a firm that committed an environmental violation, but excluding the environmental dimension. For the case of a social violation, we use the other CSR dimensions (environmental and corporate governance), but excluding the employment dimension. *Interlocked* is a dummy variable that takes a value of one for firms that share a director with a firm that has been affected by corporate misconduct for three years after the event. $X_{i,t}$ represents a vector of control variables that include the lag of size, profitability, tangibility, market-to-book ratio, log(sales), cash and equivalents divided by the book value of assets, ROA, book leverage, cash flow to assets, innovation, R&D to total assets, firm age, the CEO/Chairman dummy, gender ratio, independent director ratio, board size and board tenure. $\varphi_i$ represents firm fixed effects and $\mu_{jt}$ represents industry-year fixed effects. Standard errors are clustered at the firm level and they are reported in parentheses. *, **, and *** represent significance at the 10%, 5%, and 1% level, respectively. All variables are defined in Appendix A.

| Violation: | Environmental | | Social | |
|---|---|---|---|---|
| CSR | Social + Governance | | Environmental + Governance | |
| | Strengths | Score | Strengths | Score |
| | (1) | (2) | (3) | (4) |
| *Interlocked* | .002 | -.0006 | -.006 | -.006 |
| | (.004) | (.005) | (.005) | (.006) |
| Control Variables | Yes | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes | Yes |
| Industry-Year FE | Yes | Yes | Yes | Yes |
| Obs. | 12888 | 12888 | 10824 | 10824 |
| $R^2$ | .736 | .72 | .776 | .729 |

**Table 7: Size of the penalty and size of the misconduct firm**

This table reports the results from difference-in-differences regressions that estimate the effect on the CSR of interlocked firms after of a corporate violation. We estimate the following regression equation for CSR Strengths and CSR Score with respect to the environmental and social dimension:

$$CSR_{i,j,t} = \alpha + \beta_1 \times Interlocked_{it} + \Gamma' X_{i,j,t-1} + \varphi_i + \mu_{jt} + \epsilon_{i,j,t}$$

Moreover, Panel A splits the sample in three groups according to the size of the penalty (terciles) that the firm involved in the corporate misconduct had to pay. Panel B splits the sample in three groups according to the size of violation firm (terciles). Panel C shows the coefficient of the dummy *Interlocked* for different combination of terciles with respect to the size of the penalty and the size of the violation firm. *Interlocked* is a dummy variable that takes a value of one for firms that share a director with a firm that has been affected by corporate misconduct for three years after the event. $X_{i,t}$ represents a vector of control variables that include the lag of size, profitability, tangibility, market-to-book ratio, log(sales), cash and equivalents divided by the book value of assets, ROA, book leverage, cash flow to assets, innovation, R&D to total assets, firm age, the CEO/Chairman dummy, gender ratio, independent director ratio, board size and board tenure. $\varphi_i$ represents firm fixed effects and $\mu_{jt}$ represents industry-year fixed effects. Standard errors are clustered at the firm level and they are reported in parentheses. *, **, and *** represent significance at the 10%, 5%, and 1% level, respectively. All variables are defined in Appendix A.

Panel A: Size of the Fines

| | Environmental Violation | | | | | | Social Violation | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CSR: | Strengths | | | Score | | | Strengths | | | Score | | |
| Fine Tercile: | B | M | T | B | M | T | B | M | T | B | M | T |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| *Interlocked* | .017 | .031*** | .021** | .011 | .038*** | .021* | -.003 | .006 | .0009 | -.007 | -.0001 | -.0004 |
| | (.012) | (.011) | (.010) | (.011) | (.012) | (.013) | (.009) | (.008) | (.009) | (.010) | (.011) | (.010) |
| Control Variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry-Year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Obs. | 4165 | 4419 | 4187 | 4165 | 4419 | 4187 | 3740 | 3356 | 3630 | 3740 | 3356 | 3630 |
| $R^2$ | .753 | .743 | .786 | .767 | .726 | .76 | .709 | .757 | .805 | .709 | .757 | .805 |

Panel B: Size of the Misconduct Firm

| | Environmental Violation | | | | | | Social Violation | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CSR: | Strengths | | | Score | | | Strengths | | | Score | | |
| Fine Tercile: | B | M | T | B | M | T | B | M | T | B | M | T |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| *Interlocked* | .031*** | .024** | .019** | .039*** | .019 | .020** | -.003 | .007 | .007 | -.013 | .015 | .0002 |
| | (.012) | (.012) | (.009) | (.012) | (.013) | (.010) | (.007) | (.008) | (.009) | (.009) | (.010) | (.010) |
| Control Variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry-Year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Obs. | 4227 | 4129 | 4415 | 4227 | 4129 | 4415 | 3623 | 3481 | 3622 | 3623 | 3481 | 3622 |
| $R^2$ | .689 | .766 | .788 | .701 | .761 | .772 | .737 | .785 | .779 | .744 | .768 | .769 |

Panel C: Interplay between Size of the Fine and Size of the Misconduct Firm

| | | Environmental Violation | | | |
|---|---|---|---|---|---|
| | | CSR Strengths | | CSR Score | |
| | | *Firm Size* | | *Firm Size* | |
| | | B | T | B | T |
| *Fine* | *B* | .028 | .037* | .029 | .036* |
| *Size* | | (.020) | (.020) | (.018) | (.021) |
| | *T* | .051** | .026** | .062*** | .034** |
| | | (.022) | (.011) | (.023) | (.015) |

**Table 8: Environmental violations and director influence**

This table reports the results from difference-in-differences regressions that estimate the effect on the CSR of interlocked firms after of a corporate violation. We estimate the following regression equation for the CSR Score:

$$CSR_{i,j,t} = \alpha + \beta_1 \times Interlocked_{it} + \Gamma' X_{i,t-1} + \varphi_i + \mu_{jt} + \epsilon_{i,j,t}$$

Moreover, we split the sample in two (above/below the median) according to director's characteristics, such as tenure and the number of boards on which the director serves. Also, we split the sample according to the board size and institutional ownership (above/below the median) and whether the firm belongs to a polluting (non-polluting industry). *Interlocked* is a dummy variable that takes a value of one for firms that share a director with a firm that has been affected by corporate misconduct for three years after the event. $X_{i,t}$ represents a vector of control variables that include the lag of size, profitability, tangibility, market-to-book ratio, log(sales), cash and equivalents divided by the book value of assets, ROA, book leverage, cash flow to assets, innovation, R&D to total assets, firm age, the CEO/Chairman dummy, gender ratio, independent director ratio, board size and board tenure . $\varphi_i$ represents firm fixed effects and $\mu_{jt}$ represents industry-year fixed effects. Standard errors are clustered at the firm level and they are reported in parentheses. *, **, and *** represent significance at the 10%, 5%, and 1% level, respectively. All variables are defined in Appendix A.

| | Tenure | | Number of Boards | | Board Size | | Inst. Investor Own. | | Polluting Industries | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Low | High | Low | High | Low | High | Low | High | No | Yes |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| *Interlocked* | .009 | .028*** | .018* | .034*** | .019** | .019* | .008 | .026** | .015 | .017** |
| | (.010) | (.009) | (.009) | (.011) | (.010) | (.011) | (.008) | (.010) | (.009) | (.009) |
| Obs. | 6297 | 6474 | 7077 | 4343 | 6334 | 5086 | 6485 | 6406 | 4667 | 8224 |
| $R^2$ | .737 | .714 | .716 | .769 | .677 | .766 | .722 | .736 | .676 | .706 |

## Table 9: Corporate Liquidity

This table reports the results from difference-in-differences regressions that estimate the effect on the CSR of interlocked firms after of a corporate violation. We estimate the following regression equation for the CSR Score:

$$CSR_{i,j,t} = \alpha + \beta_1 \times Interlocked_{it} + \Gamma' X_{i,t-1} + \varphi_i + \mu_{jt} + \epsilon_{i,j,t}$$

Moreover, we split the sample in two (financially constraint: bottom quartile and unconstrained: the top three quartiles) according to the average corporate liquidity (cash and equivalents to total assets and operating cash flow to total assets) during the years prior to the penalty. We define unconstrained firms as the treated firms in the top three quartiles of the corporate liquidity distribution. *Interlocked* is a dummy variable that takes a value of one for firms that share a director with a firm that has been affected by corporate misconduct for three years after the event. $X_{i,t}$ represents a vector of control variables that include the lag of size, profitability, tangibility, market-to-book ratio, log(sales), cash and equivalents divided by the book value of assets, ROA, book leverage, cash flow to assets, innovation, R&D to total assets and firm age, the CEO/Chairman dummy, gender ratio, independent director ratio, board size and board tenure. $\varphi_i$ represents firm fixed effects and $\mu_{jt}$ represents industry-year fixed effects. Standard errors are clustered at the firm level and they are reported in parentheses. *, **, and *** represent significance at the 10%, 5%, and 1% level, respectively. All variables are defined in Appendix A.

| | CSR Score | | | |
|---|---|---|---|---|
| | Cash Flow/TA | | Cash/ TA | |
| | Low | High | Low | High |
| | (5) | (6) | (7) | (8) |
| *Interlocked* | -.0007 | .021*** | .004 | .022*** |
| | (.014) | (.008) | (.015) | (.008) |
| Obs. | 3107 | 9784 | 3185 | 9706 |
| $R^2$ | .753 | .703 | .75 | .684 |

## Table 10: Environmental Impact

This table reports the results from difference-in-differences regressions that estimate the effect of an interlocked firm's CSR on future environmental violations. We estimate the following regression where our dependent variable is the number of environmental violations ($NEnv_{ijt}$):

$$NEnv_{ijt} = \alpha + \beta_1 CSR_{i,j,t} \times Interlocked_{it} + \beta_2 CSR_{i,j,t} + \beta_3 Interlocked_{it} + \Gamma' X_{i,t-1} + \varphi_i + \mu_{jt} + \epsilon_{i,j,t}$$

*Interlocked* is a dummy variable that takes a value of one for firms that share a director with a firm that has been affected by corporate misconduct for three years after the event. $X_{i,t}$ represents a vector of control variables that include the lag of size, profitability, tangibility, market-to-book ratio, log(sales), cash and equivalents divided by the book value of assets, ROA, book leverage, cash flow to assets, innovation, R&D to total assets, firm age the CEO/Chairman dummy, gender ratio, independent director ratio, board size and board tenure. $\varphi_i$ represents firm fixed effects and $\mu_{jt}$ represents industry-year fixed effects. Standard errors are clustered at the firm level and they are reported in parentheses. *, **, and *** represent significance at the 10%, 5%, and 1% level, respectively. All variables are defined in Appendix A.

| Dependent Variable: | Number of Environmental Violations | | |
|---|---|---|---|
| Time Window: | [-3,+1] | [-3,+2] | [-3,+3] |
| | (1) | (2) | (3) |
| *Interlocked* × *CSR* | -.455 | -.392** | -.355** |
| | (.282) | (.200) | (.172) |
| *CSR* | .124 | .135 | .153 |
| | (.198) | (.186) | (.185) |
| *Interlocked* | -.052 | -.011 | -.022 |
| | (.052) | (.044) | (.039) |
| Control Variables | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes |
| Industry-Year FE | Yes | Yes | Yes |
| Obs. | 9933 | 11541 | 12891 |
| $R^2$ | .754 | .743 | .726 |

## Appendix A - Variable Definitions

### Environmentally-related CSR:

| | |
|---|---|
| *Environmental Strengths* | MSCI ESG (KLD) environmental strengths |
| *Environmental Concerns* | MSCI ESG (KLD) environmental concerns |
| *Environmental Score* | MSCI ESG (KLD) environmental score |

### Socially-related CSR:

| | |
|---|---|
| *Social Strengths* | MSCI ESG (KLD) social strengths, along the following CSR dimensions: human relations, diversity, human rights. |
| *Social Concerns* | MSCI ESG (KLD) social concerns, along the following CSR dimensions: human relations, diversity, human rights |
| *Social Score* | MSCI ESG (KLD) social score, along the following CSR dimensions: human relations, diversity, human rights |

### Firm Characteristics:

| | |
|---|---|
| *Book Leverage* | Short-term debt plus long-term debt divided by book value of assets |
| *Cash/TA* | Cash and equivalents divided by book value of assets |
| *Cash Flow* | Cash flow from operations divided by total assets |
| *Firm Age* | Firm age |
| *Innovation* | Intangible assets over book value of total assets |
| *MTB* | Sum of the market value of equity and total liabilities divided by book value of assets |
| *Profitability* | Operating income before depreciation divided by book value of assets |
| *Tangibility* | Net PPE divided book value of assets. |
| *R&D/TA* | Research and development expenses divided by book value of assets |
| *ROA* | Net income divided by book value of assets |
| *Log (Sales)* | The logarithm of total sales |
| *Size* | The logarithm of book value of assets |
| *Div/TA* | Total dividends paid divided by book value of assets |

**Board Characteristics:**

| | |
|---|---|
| *CEO/Chairman* | Dummy variable that takes the value of one when the CEO is also the chairman of the board, and zero otherwise |
| *Gender Ratio* | Percentage of male directors on the board |
| *Ind. Director Ratio* | Percentage of independent directors on the board |
| *Log Board Tenure* | The logarithm of the average tenure of the board members |
| *Log Board Size* | The logarithm of the number of board members |

## Appendix B. Example of a Corporate Violation

To gain a better understanding of our empirical setting, we can illustrate with an example from the Violation Tracker dataset. Specifically, Wal-Mart in 2013 (May 28) pleaded guilty to Federal Environmental Crimes, also the firm admitted civil violations and agreed to pay more than $81 Million.[10] The Department of Justice issued a press release with the following information:

*"Wal-Mart Pleads Guilty to Federal Environmental Crimes, Admits Civil Violations and Will Pay More Than $81 Million*

*Retailer Admits Violating Criminal and Civil Laws Designed to Protect Water Quality and to Ensure Proper Handling of Hazardous Wastes and Pesticides*

*Wal-Mart Stores Inc. pleaded guilty today in cases filed by federal prosecutors in Los Angeles and San Francisco to six counts of violating the Clean Water Act by illegally handling and disposing of hazardous materials at its retail stores across the United States. The Bentonville, Ark.-based company also pleaded guilty today in Kansas City, Mo., to violating the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) by failing to properly handle pesticides that had been returned by customers at its stores across the country.*

*"As a result of the three criminal cases brought by the Justice Department, as well as a related civil case filed by the U.S. Environmental Protection Agency (EPA), Wal-Mart will pay approximately $81.6 million for its unlawful conduct. Coupled with previous actions brought by the states of California and Missouri for the same conduct, Wal-Mart*

[10] https://www.justice.gov/opa/pr/wal-mart-pleads-guilty-federal-environmental-crimes-admits-civil-violations-and-will-pay-more

*will pay a combined total of more than $110 million to resolve cases alleging violations of federal and state environmental laws".*

*" In conjunction with today's guilty pleas in the three criminal cases, Wal-Mart has agreed to pay a $7.628 million civil penalty that will resolve civil violations of FIFRA and Resource Conservation and Recovery Act (RCRA). In addition to the civil penalties, Wal-Mart is required to implement a comprehensive, nationwide environmental compliance agreement to manage hazardous waste generated at its stores. The agreement includes requirements to ensure adequate environmental personnel and training at all levels of the company, proper identification and management of hazardous wastes, and the development and implementation of Environmental Management Systems at its stores and return centers. Compliance with this agreement is a condition of probation imposed in the criminal cases".*

**Table IAI: Frequency of violation and treated firms by industry.**

This table reports the distribution of the environmental and social violations and treated firms by industry.

| Corporate Violation: | | Environmental | | Social | |
|---|---|---|---|---|---|
| | | Violation | Treated | Violation | Treated |
| | Total | 299 | 484 | 384 | 527 |
| | % of treated and violation firms in the same industry | 5.59% | | 9.99% | |
| 2-Digit SIC code | Frequency by industry | Violation | Treated | Violation | Treated |
| 01 | Agricultural Production – Crops | 4 | 0 | 0 | 1 |
| 10 | Metal, Mining | 2 | 0 | 0 | 2 |
| 12 | Coal Mining | 1 | 0 | 2 | 0 |
| 13 | Oil & Gas Extraction | 27 | 25 | 3 | 12 |
| 14 | Nonmetallic Minerals, Except Fuels | 2 | 2 | 0 | 0 |
| 15 | General Building Contractors | 2 | 4 | 2 | 4 |
| 16 | Heavy Construction, Except Building | 0 | 3 | 5 | 2 |
| 17 | Special Trade Contractors | 0 | 2 | 0 | 1 |
| 20 | Food & Kindred Products | 12 | 15 | 22 | 19 |
| 21 | Tobacco Products | 0 | 2 | 0 | 1 |
| 22 | Textile Mill Products | 0 | 1 | 0 | 0 |
| 23 | Apparel & Other Textile Products | 0 | 3 | 7 | 1 |
| 24 | Lumber & Wood Products | 0 | 2 | 0 | 3 |
| 25 | Furniture & Fixtures | 0 | 4 | 0 | 2 |
| 26 | Paper & Allied Products | 5 | 6 | 2 | 3 |
| 27 | Printing & Publishing | 0 | 8 | 0 | 7 |
| 28 | Chemical & Allied Products | 31 | 59 | 14 | 46 |
| 29 | Petroleum & Coal Products | 48 | 8 | 5 | 4 |
| 30 | Rubber & Miscellaneous Plastics Products | 0 | 5 | 2 | 4 |
| 31 | Leather & Leather Products | 0 | 1 | 3 | 2 |
| 32 | Stone, Clay, & Glass Products | 0 | 3 | 0 | 1 |
| 33 | Primary Metal Industries | 14 | 7 | 4 | 8 |
| 34 | Fabricated Metal Products | 1 | 7 | 4 | 10 |
| 35 | Industrial Machinery & Equipment | 4 | 34 | 9 | 41 |
| 36 | Electronic & Other Electric Equipment | 0 | 23 | 10 | 43 |
| 37 | Transportation Equipment | 10 | 22 | 11 | 18 |
| 38 | Instruments & Related Products | 2 | 21 | 3 | 32 |

| | | | | | |
|---|---|---|---|---|---|
| 39 | Miscellaneous Manufacturing Industries | 1 | 3 | 0 | 1 |
| 40 | Railroad Transportation | 7 | 1 | 4 | 0 |
| 41 | Local & Interurban Passenger Transit | 0 | 0 | 1 | 0 |
| 42 | Trucking & Warehousing | 0 | 3 | 10 | 3 |
| 44 | Water Transportation | 4 | 1 | 1 | 1 |
| 45 | Transportation by Air | 2 | 4 | 16 | 0 |
| 47 | Transportation Services | 0 | 1 | 2 | 1 |
| 48 | Communications | 5 | 18 | 25 | 20 |
| 49 | Electric, Gas, & Sanitary Services | 80 | 43 | 14 | 42 |
| 50 | Wholesale Trade – Durable Goods | 0 | 13 | 4 | 13 |
| 51 | Wholesale Trade – Nondurable Goods | 0 | 7 | 8 | 8 |
| 52 | Building Materials & Gardening Supplies | 6 | 1 | 12 | 0 |
| 53 | General Merchandise Stores | 10 | 11 | 24 | 3 |
| 54 | Food Stores | 1 | 2 | 9 | 2 |
| 55 | Automative Dealers & Service Stations | 2 | 4 | 4 | 5 |
| 56 | Apparel & Accessory Stores | 1 | 4 | 19 | 11 |
| 57 | Furniture & Homefurnishings Stores | 0 | 0 | 2 | 1 |
| 58 | Eating & Drinking Places | 0 | 5 | 31 | 8 |
| 59 | Miscellaneous Retail | 1 | 8 | 16 | 12 |
| 70 | Hotels & Other Lodging Places | 0 | 1 | 4 | 0 |
| 72 | Personal Services | 1 | 1 | 9 | 1 |
| 73 | Business Services | 1 | 62 | 44 | 100 |
| 75 | Auto Repair, Services, & Parking | 1 | 0 | 1 | 1 |
| 78 | Motion Pictures | 0 | 1 | 1 | 0 |
| 79 | Amusement & Recreation Services | 0 | 4 | 1 | 6 |
| 80 | Health Services | 0 | 5 | 11 | 7 |
| 82 | Educational Services | 0 | 1 | 1 | 1 |
| 83 | Social Services | 0 | 0 | 0 | 0 |
| 87 | Engineering & Management Services | 0 | 13 | 2 | 11 |
| 99 | Non-Classifiable Establishments | 11 | 0 | 0 | 2 |