The Geographic Spillover of Director Knowledge: Evidence from Environmental and Social Incidents

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Version: August 2025

Abstract

Integrating corporate social responsibility (CSR) into corporate policies requires considerable knowledge input from the board. We argue that directors may acquire CSR knowledge from nearby directors of other firms through local social interactions. Empirically, we propose a novel spillover measure based on the geographic overlap of directors from different firms. We find that the environmental and social incidents of a firm increase with those of other firms when their directors have more geographic overlap; the effect is stronger when stakeholders exert more pressure on directors for CSR. Overall, we uncover a new mechanism through which corporate policies propagate across firms.

Keywords: Directors, E&S Incidents, Corporate Social Responsibility, Geographic Spillover, Social Network.
JEL Classifications: D83, G30, M14.

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1. Introduction

A company's good relationship with employees, customers, suppliers, communities and the environment can reduce risk and create intangible assets that deliver long-term returns (e.g., Lins, Servaes, and Tamayo 2017; Edmans 2023). One way for companies to capture these benefits is to integrate environmental and social (E&S) considerations into their corporate policies. However, as discussed by Liang and Renneboog (2017), it is not fully understood why some companies are more proactive than others in corporate social responsibility (CSR).

Incorporating E&S issues into organizational processes requires the board's motivations and actions; however, directors may lack the necessary knowledge to advise managers to develop and integrate E&S policies into the entire organization because such knowledge may be tacit and complex (Eccles, Ioannou, and Serafeim 2014).[1] The current literature on directors' social network documents that they imitate or acquire knowledge on corporate policies from alumni peers, professional organization acquaintances, and current and past colleagues (e.g., Shue 2013; Fracassi 2017). Meanwhile, directors, being humans (or "social animals" as Aristotle put it), may run into directors of other firms in the neighborhood at the same worship place, private/hobby club, and local community activities etc. These random encounters increase the chance that directors in the same neighborhood get connected as acquaintances or friends and have more ongoing interactions.

Drawing on the broad literature on location-centric knowledge spillover (e.g., Audretsch and Feldman 1996; Pool, Stoffman, and Yonker 2015; Lychagin et al. 2016; Wallskog 2025), we posit that nearby directors from different firms may communicate and share experience on CSR practices through local social interactions (e.g., Husted, Jamali, and Saffar 2016), as face-to-face communication is essential for the transfer of tacit and complex knowledge (Storper and Venables 2004). As a result, directors may intentionally leverage on, or unintentionally pick up, the managerial knowledge of nearby directors. We hypothesize that the spillover of managerial knowledge will shape the directors' attitude towards CSR and practices across firms.[2] We

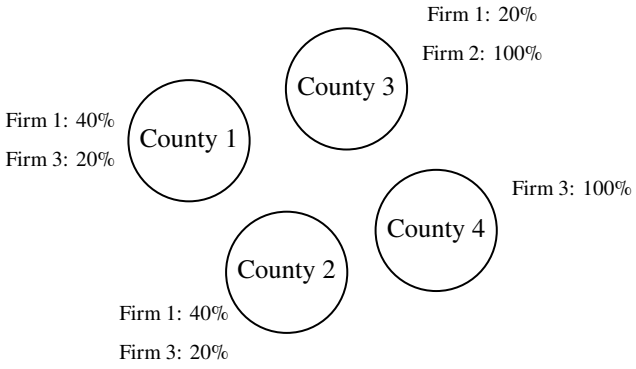
[1] Essentially, "tacit knowledge" cannot be easily codified and it generally applies to managerial knowledge. This is especially relevant to E&S issues as they can be dynamic and change with the economic environment; see: https://hbr.org/sponsored/2023/04/you-can-reduce-costs-and-still-achieve-esg-goals.

[2] It is important to stress that even for firms without explicit E&S committees, they still need managerial

further hypothesize that the CSR demand by stakeholders will motivate directors to acquire the related knowledge from peers, leading to a stronger spillover effect of CSR practices.

Empirically, we study the spillover of E&S incidents across firms with geographically proximate directors, under the premise that E&S incidents elicit the underlying CSR practices.[3] To measure the spillover effect based on geographic proximity, we propose a novel measure (denoted as *Spillover*) that takes into account the geographic overlap of directors from different firms. Specifically, it is the weighted average of E&S incidents of the focal firms' "direct peers" (defined in this paper as those firms having director overlaps with the focal firm in at least one county), where the weights measure the degree of director overlap or the "geographic proximity" as in Lychagin et al. (2016).

Figure 1: A hypothetical example to illustrate geographic spillover



Note: This figure shows the shares of directors of three firms in four counties.

We illustrate this idea using the hypothetical example in Figure 1 with three firms whose directors are located in four different counties (details of construction in Section 3).[4] In this example, Firm 1 and Firm 2 (respectively Firm 1 and 3) are direct peers because they have director overlap in county 3 (respectively county 1 and county 2). However, Firm 2 and Firm

knowledge for E&S relevant policies such as pollution control, workplace safety, and employee retention that have long existed before the term ESG becomes popular. Essentially, it is the attitude and consideration on E&S issues that matter. As such, we follow Edmans (2023) that ESG is nothing special but just reflects various aspects of corporate policies.

[3]Our choice of E&S incidents, instead of E&S scores, follows Derrien et al. (Forthcoming) and is guided by the literature that E&S scores often involve declarative policies and targets that may not reveal the underlying practices (e.g. Asgharian et al. 2024). Besides, aggregate E&S scores are also subject to inconsistency among rating providers (Berg, Kölbel, and Rigobon 2022). On the other hand, we do not consider governance incidents because there are concerns that the focus on governance issues by commercial databases is different from those in academic studies (see Hong, Kubik, and Scheinkman 2012; Krüger 2015; Dai, Liang, and Ng 2021).

[4]This example is adopted from Lychagin et al. (2016); they study the geographic proximity of inventors whereas in our case, we study the geographic proximity of directors.

3 are *not* direct peers because they do not have director overlap in all 4 counties. Firm 1 has a larger overlap of directors' counties with Firm 3 than Firm 2. If local spillover of director knowledge exists, we should expect that firms having larger director overlaps with the focal firm play a larger role in affecting the focal firm. Therefore, when we calculate *Spillover* for Firm 1 (to measure the influence of E&S issues of other firms on Firm 1), the E&S issues of Firm 3 will be assigned a larger weight than those of Firm 2. Note that *Spillover* is conceptually different from headquarter proximity in the literature (e.g., Almazan et al. 2010; Dougal, Parsons, and Titman 2015; Kedia and Rajgopal 2009; Matsumoto, Serfling, and Shaikh 2022) in that Spillover considers the degree of location overlaps among directors across firms while headquarter proximity only measures the distance between headquarters.

We use two data sources to construct Spillover. First, we use the directors' reported ZIP codes obtained from LSEG (formerly Thomson) Insider Filing to identify directors' counties and measure the director overlap (see Section 4.1 for more details). Second, we measure the extent of E&S issues by the number E&S incidents from RepRisk. We control for firm characteristics and possible spillover effects from headquarters (firms headquartered in the same county), industry (firms in the same industry but outside the state), and supplier-customer (firms along the supply chain).[5] We include firm, state-by-year, and industry-by-year fixed effects to control for unobserved factors. The resulting dataset contains 30,280 firm-year observations from 3,948 firms over 2007-2022.

Our baseline specifications show that current-year *Spillover* can positively predict the number of E&S incidents of the focal firm in the following year. The result also holds when we examine spillovers of either environmental (E) or social (S) incidents. These results are robust after removing directors who share common social network (CSN) from employment, education, and common active roles in other organizations (Fracassi 2017). The results suggest that geographic proximity among directors, in the form of director overlaps at the county-level, has effects beyond existing identified spillover channels via headquarters, industry peers, supply chain, and common social network.[6] As the *Spillover* effect might just reflect location-wise

[5]For example, Leary and Roberts (2014), Cao, Liang, and Zhan (2019), Dai, Liang, and Ng (2021), and Asgharian et al. (2024).

[6]An alternative mechanism of managerial knowledge spillover is that directors learn about E&S incidents from nearby directors of other firms and improve their E&S-related policies to reduce future incidents. This mechanism

common social norms rather than director-wise spillover, we construct a spillover measure based on social connectedness among regions and control for it in the regression.[7] Although social connection spillover can positively predict future E&S incidents (which is a new result on its own), *Spillover* is not subsumed and remains significant.

It is well recognized in the literature that identifying social peer effect is challenging (e.g., Manski 1993).[8] In particular, besides via social peers, a group level effect can result from directors' common location preference or from unobserved effects on the group level. We identify the social peer effect by exploiting the partial overlapping structure of networks (Bramoullé, Djebbari, and Fortin 2009, De Giorgi, Pellizzari, and Redaelli 2010), based on the notion that "the friends of my friends are not necessarily my friends". Essentially, we construct an instrument for *Spillover* based on firms related to the direct peers of focal firms but not directly related to the focal firms (construction details in Section 5.1). In the two-stage least square (2SLS) regressions, we obtain similar results as in the baseline specifications. In terms of economic significance, a one standard-deviation of higher Spillover leads to 0.648 more E&S incidents of the focal firms, which is sizable compared with the average 1.735 incidents per firm-year and the fact that most firms do not experience any E&S incidents in a particular year.

In addition, we explore two events as shocks exogenous to existing peer groups to help identify peer effects.[9] First, the COVID-19 lockdown provides an exogenous shock that severely reduces interpersonal interaction among directors. If the transfer of managerial E&S knowledge is channeled through in-person communications, the lockdown event should reduce the spillover effect. We exploit the degree of lockdown policy stringency and the drop in mobility across regions, and find that firms with directors in more affected regions have significantly smaller spillover effect. Second, the coverage by a major ESG data vendor serves as a shock to facilitate

will suggest a *negative* spillover effect of E&S incidents. However, our empirical results do not support this mechanism.

[7] Specifically, location-wise social connection is measured by the Social Connectedness Index of Facebook which is the likelihood that users from a pair of counties are connected. Several recent studies have adopted this index to measure social connectedness among regions. For example, Au, Dong, and Zhou (2024), Bailey et al. (2018), Griffin, Kruger, and Mahajan (2024) and Peng et al. (2023).

[8] Specifically, Cao, Liang, and Zhan (2019) recognize that "Identifying the causal effect of peer effects among corporations is notoriously difficult. Equally difficult is identifying whether this peer effect has a social component." Parsons, Sulaeman, and Titman (2018) acknowledge that they cannot "credibly distinguish endogenous effects from other potential determinants of local norms."

[9] See Leary and Roberts (2014) and Dougal, Parsons, and Titman (2015) for discussions about the importance of exogenous shocks in identifying peer effects.

scrutiny by investors (e.g., Aghamolla and An 2023; Darendeli et al. 2022; Lu 2024; Xue 2023). The resulting pressure will press directors to seek knowledge from peers on E&S practices.[10] We find that the director spillover effect is significantly stronger after Refinitiv ASSET4 has initiated ESG ratings for the focal firm.

Moreover, we examine two moderating effects from stakeholders. First, long-term investors are incentivized to engage with and monitor firms for CSR improvements (e.g., Chen, Harford, and Li 2007; Cremers, Pareek, and Sautner 2020). Second, customers, employees, and investors in Democratic-leaning counties should place more scrutiny on CSR than those in Republican-leaning counties (e.g., Duan, Li, and Michaely 2023; Cen, Qiu, and Wang 2023; Tian and Shi 2023). Consequently, directors should be under more pressure to acquire CSR knowledge. We find stronger spillover effects for firms owned by more long-term institutional investors and firms in Democratic counties.

We contribute to the literature in several important ways. First, we propose a novel spillover measure based on directors' location overlap across firms and uncover a new channel of spillovers of corporate outcomes in the context of social influence. One strand of this literature studies the geographical dimension and examines how headquarter locations are related to social influence that affects CEO compensation, acquisitions, investments, financial misconduct, and management earnings forecasts (e.g. Almazan et al. 2010; Dougal, Parsons, and Titman 2015; Kedia and Rajgopal 2009; Matsumoto, Serfling, and Shaikh 2022; Parsons, Sulaeman, and Titman 2018). Another strand of the literature focuses on common social networks and finds that firms with executives in common social networks have similar corporate policies, (e.g. Bakke et al. 2024; Burzynska et al. 2024; Fracassi 2017; Shue 2013). Husted, Jamali, and Saffar (2016) and Alves (2025) are closely related to our paper in that they also investigate CSR spillover across firms—the former on headquarter spillover and the latter on spillover through directors' common social networks. We contribute by showing that face-to-face interactions among directors in the neighborhood across firms influence CSR outcomes; our results still hold after we control for headquarter proximity or exclude directors in common social networks.

[10]Note that we do not require ESG ratings to be truly reflective of the underlying ESG practices. We only require that the ratings are deemed as important by investors (e.g. Hartzmark and Sussman 2019). Despite the documented rating divergence (e.g. Berg, Kölbel, and Rigobon 2022), Serafeim and Yoon 2022, 2023) find that ESG ratings can predict ESG incidents, suggesting that ESG ratings are not totally detached from ESG incidents.

Second, our research contributes to the understanding on how interactions among firms play a role in CSR. Existing studies in this literature mostly focus on the influence from economically linked firms such as product-market peers (Flammer 2015; Cao, Liang, and Zhan 2019) and corporate suppliers and customers (Bisetti, She, and Zaldokas 2025; Dai, Liang, and Ng 2021; Darendeli et al. 2022; Schiller 2018). We show that interactions among firms that are not economically linked (i.e., through geographically proximate directors) also play an important role in CSR outcomes.

Third, we contribute to the growing literature that exploits ESG incidents. Several recent studies examine the market and analyst reactions after ESG incidents (e.g., Derrien et al. Forthcoming; Krüger 2015; Serafeim and Yoon 2022, 2023; Wong and Zhang 2022) and others investigate firms' subsequent actions (e.g., Gantchev, Giannetti, and Li 2022; Akey et al. 2023; Gertsberg, Jung, and Zhang 2024). While most studies take ESG incidents as given, very few examines the prediction of their occurrence (except He, Kahraman, and Lowry 2023; Serafeim and Yoon 2023). We show that the occurrence of E&S incidents is affected by directors' nearby peers and thus contribute to this literature by probing into the drivers, beyond the current main focus on the *consequences* of ESG incidents.

2. Hypothesis development

Having good CSR practices can reduce risks such as penalties from regulation breaches, customer loss, and reputation loss from negative CSR incidents; the resulting intangible asset will deliver long-term returns and eventually benefit shareholders (e.g., Edmans 2023). To this end, the board's motivation and efforts of incorporating CSR at the strategic level play the most important role (e.g. Kassinis and Vafeas 2002; Eccles, Ioannou, and Serafeim 2014).[11] The oversight on CSR can be placed on the full board's agenda or relegated to committees (either existing or one dedicated for CSR). The adopted structure is eventually shaped by firm-specific circumstances such as directors' awareness and motivation, board culture, committee structure,

[11] In fact, the European Commission points out that firms can become socially responsible by integrating the related concerns into business strategies and operations; see: https://single-market-economy.ec.europa.eu/industry/sustainability/corporate-sustainability-and-responsibility_en.

industry and specific CSR issues.[12]

Under the resource dependence theory (e.g., Hillman, Withers, and Collins 2009; Pfeffer and Salancik 2015), the board provisions the necessary knowledge and insights for advising strategies. First and foremost, directors' motivation on CSR, as part of the knowledge they bring to the firm, governs the extent of CSR oversight by the board. However, the flexibility of CSR oversight suggests that there is no uniform board structure for this purpose, implying that CSR knowledge is required to build an effective CSR board structure. An example is that the board constructs CSR key performance indicators for the audit committee to monitor, while it is unclear what dimensions from the entire CSR universe should be included and how they can be monitored effectively under resource constraints. Similar considerations apply to the dedicated CSR committee, if it is set up. Moreover, detailed CSR considerations may interleave regular board agendas while the directors may not have sufficient background for CSR advice. For example, a director may be an expert on traditional outsourcing strategy but not on the related CSR issues such as customer demand on responsible sourcing. In other words, the knowledge required to integrate CSR considerations into organizational processes and practices can be tacit and complex (Eccles, Ioannou, and Serafeim 2014).[13, 14]

Corporate policies tend to propagate across firms through channels such as learning and peer influence. Unsure of the optimal corporate policies, managers may imitate practices of other firms. For example, financing decisions are influenced by industry peer firms (Graham and Harvey 2001; Leary and Roberts 2014). Information and beliefs may also spread around nearby geographical regions or through peer social network, thus motivating executives to "keep up with the Joneses". CEO compensation, acquisitions, and investments are found to be similar across firms with proximate headquarters and with executives in common social networks (e.g., Kedia and Rajgopal 2009; Matsumoto, Serfling, and Shaikh 2022; Fracassi 2017; Shue 2013).

[12] See the discussion, e.g., in "ESG Governance: Board and Management Roles & Responsibilities" Jurgita Ashley and Randi Val Morrison, Harvard Law School Forum on Corporate Governance, November 10, 2021, https://corpgov.law.harvard.edu/2021/11/10/esg-governance-board-and-management-roles-responsibilities/.

[13] Tacit knowledge is difficult to explicitly express and replicate and is often experience-based. In contrast, explicit knowledge can be codified and easily transferred through oral explanations and documents (Nelson and Winter 1985; Teece and Pisano 1994).

[14] Although certain frameworks on sustainable business, such as ISO 20400 and ISO 26000, provide explicit and codified CSR knowledge, they are nonetheless not exhaustive of all CSR activities. Moreover, it requires managerial experience and judgement to select and implement the relevant guidance into organizational processes.

As such, it is possible that corporate policies on CSR also propagate across firms when directors' belief on the importance of CSR is influenced by their peers and when they regard practices of peer firms as exemplars and imitate.

Since efficient transmission of tacit knowledge (in our case, CSR considerations) often requires face-to-face contacts (Storper and Venables 2004; Husted, Jamali, and Saffar 2016) and geographic proximity is crucial to such interactions, we argue that geographic proximity of peer directors could potentially be an additional channel for CSR policy spillover, beyond the existing channels through industry peers (Cao, Liang, and Zhan 2019) and supply chain (Bisetti, She, and Zaldokas 2025; Dai, Liang, and Ng 2021; Darendeli et al. 2022; Schiller 2018).

There is ample evidence of local knowledge exchange/acquisition in the context of innovation (Jaffe, Trajtenberg, and Henderson 1993; Audretsch and Feldman 1996; Lychagin et al. 2016), managerial knowledge (Fu 2012; Husted, Jamali, and Saffar 2016), investment (Bernstein, Giroud, and Townsend 2016; Pool, Stoffman, and Yonker 2015; Chen et al. 2022; Bai and Massa 2024; Lee 2022), and entrepreneurship (Audretsch and Lehmann 2005; Wallskog 2025). A premise of these studies is that information exchange is more effective when agents are geographically proximate because face-to-face communication conveys rich information by providing immediate feedback and various cues such as body language and tone of voices that facilitate interpretation (e.g., Daft and Lengel 1986) and is thus effective in exchanging tacit knowledge. Furthermore, face-to-face communication can help build up trust and foster social bonds (Cummings, Butler, and Kraut 2002; Urry 2003; Storper and Venables 2004; Sherman, Michikyan, and Greenfield 2013), thus further facilitating knowledge exchange.

In our context, a prerequisite for geographic proximity of peer directors as a channel for CSR policy spillover is that nearby directors from different firms meet up face-to-face, facilitating the sharing of tacit knowledge on CSR. Importantly, we (as the researchers) do not observe whether such interactions exist systematically. Nevertheless, directors of different firms may have random encounters with each other in their neighborhood. For example, it is possible that they have the same religion and attend the same worship activities or join the same private/hobby clubs. As business leaders, it is also likely that they are invited to speak in the same community events and participate in the local chamber of commerce or advisory groups

(e.g., Vistage or Entrepreneurs' Organization). These routine activities in the neighborhood increase the chance that directors become acquainted or friends and have further interactions. Therefore, we argue that directors who live in the same neighborhood have a better chance to know and meet each other than those who live far apart. In other words, we adopt a similar approach of Cohen, Frazzini, and Malloy (2010) who argue that it is more likely for board members and executives attending the same school to know each other and Pool, Stoffman, and Yonker (2015) who argue that mutual fund managers residing in the same neighborhood are more likely to meet and transmit investment information.[15] Furthermore, face-to-face communication is an effective way for exchanging managerial knowledge on CSR because the detailed CSR consideration and integration into the entire firm can be tacit, non-codified, and complex. As a result, CSR policies could propagate across firms through in-person interactions among directors. The above discussion leads to our first hypothesis:

***H1**: CSR policies spill over across firms with geographically proximate directors.*

In addition to the above hypothesis, we also expect that stakeholders exert pressure on the board to be proactive on CSR issues. For example, long-term institutional investors are incentivized to monitor and push firms for pro-CSR policies (e.g. Bushee 1998; Edmans and Manso 2011; Cremers, Pareek, and Sautner 2020) because poor CSR outcomes harm firm values (Krüger 2015; Serafeim and Yoon 2022, 2023). Besides, local stakeholders from Democratic-leaning regions disfavor firms with poor CSR by diverting store visit footsteps (Duan, Li, and Michaely 2023) and investments (Tian and Shi 2023). Furthermore, the presence of CSR information facilitates scrutiny by investors (Aghamolla and An 2023; Xue 2023). Therefore, it is likely that directors are more motivated to pursue CSR-related managerial knowledge under the pressures from stakeholders, leading to a stronger spillover effect:

***H2**: The spillover effect of geographically proximate directors on CSR policies is stronger under stronger CSR demand from stakeholders.*

[15] Put it another way, if nearby directors from different companies do not interact at all, we should not expect any CSR policy spillover. This can be considered as the benchmark scenario and any empirical evidence on spillover suggests that face-to-face interactions of geographic proximate directors likely exist, even though we do not observe such interactions systematically from the data. We can see this in terms of logical statements. Specifically, if there are no face-to-face interactions between geographic proximate directors ("Not B"), we should expect no CSR policy spillover ("Not A"). Thus, evidence of CSR policy spillover ("A") would imply the existence of face-to-face interactions between geographic proximate directors ("B").

3. Construction of *Spillover*

In this section, we describe how we construct the geographic proximity weights to measure the overlap of directors of firms in different locations and our main explanatory variable in the regression analysis, *Spillover*.

Let i be the index of firms, k be the index of locations (which are counties in the empirical analysis), t be the index of time periods (which we ignore for now), F_{ik} be the fraction of firm i's directors located in county k. Using the approach in Lychagin et al. (2016), we define the following geographic proximity weight between firm i and another firm i' based on director locations:

$$w_{ii'} = \sum_{k=1}^{K} \sum_{k'=1}^{K} \frac{F_{ik} F_{i'k'}}{\sqrt{[\sum_{m=1}^{K} (F_{im}^2)][\sum_{m=1}^{K} (F_{i'm}^2)]}} \times I\{k = k'\}, \tag{1}$$

where $I\{k = k'\}$ is an indicator function which equals to 1 if county k and county k' are the same. (1) suggests that the geographic proximity weights depend on the fractions of firms' directors located in the same counties.[16] In the regression analysis, we also control for potential spillover due to geographical proximity of firm headquarters. Therefore, we use the same approach to construct a geographic proximity weight based on headquarters locations. Since firms normally have only one headquarter, the weight is simply equal to the indicator function:

$$w_{ii'}^{HQ} = I\{h = h'\}, \tag{2}$$

where county h and county h' refer to the headquarters locations of firm i and firm i'.

We illustrate the calculation of geographic weights using the same hypothetical example in Figure 1. Suppose further that Firm 1 is located in County 1, and Firm 2 and Firm 3 are located in County 4. For the shares of firm directors in different counties, we have $F_{11} = F_{12} = 0.4$, $F_{13} = 0.2$ for Firm 1, $F_{23} = 1$, $F_{31} = 0.2$ for Firm 2, and $F_{32} = F_{34} = 0.4$ for Firm 3. To compute the geographic proximity weights based on director locations, we first note that

[16] In other words, we assume that spillover effect manifests only within the same county. Lychagin et al. (2016) also consider when the spillover effect decreases exponentially with the physical distance between the two regions. Our baseline regression results are qualitatively similar when we use this alternative distance function.

$\sqrt{\sum_{m=1}^{4}(F_{1m})^2]} = 0.6$, $\sqrt{\sum_{m=1}^{4}(F_{2m})^2]} = 1$, and $\sqrt{\sum_{m=1}^{4}(F_{3m})^2]} = 0.6$. Applying Equation (1), we have $w_{12} = \frac{0.2\times1}{0.6\times1} = \frac{1}{3}$, $w_{23} = \frac{0}{1\times0.6} = 0$, and $w_{13} = \frac{0.4\times0.2+0.4\times0.4}{0.6\times0.6} = \frac{2}{3}$. On the other hand, the geographic proximity weights based on headquarters locations are $w_{12}^{HQ} = 0$, $w_{23}^{HQ} = 1$, and $w_{13}^{HQ} = 0$. Thus, based on director locations, Firm 1 is "closer" to Firm 3 than to Firm 2 because $w_{13} > w_{12}$, and Firm 2 and Firm 3 are not connected because none of their directors are located in the same county. On the other hand, based on headquarters locations, Firm 2 and Firm 3 are "close" while Firm 1 is not connected to Firm 2 and Firm 3. This example shows that geographic proximity weights based on director locations are generally different from those based on headquarters locations, unless all the directors and the headquarters are located in the same county (which is not what we observe from the data).

Given the geographic proximity weights across different time periods t, we can construct the spillover measures based on director proximity and headquarters proximity respectively as:

$$Spillover_{it} = \sum_{i\neq i'} \left(w_{ii',t} \times E\&S_{i't} \right), \tag{3}$$

$$Spillover_{it}^{HQ} = \sum_{i\neq i'} \left(w_{ii',t}^{HQ} \times E\&S_{i't} \right), \tag{4}$$

where $E\&S$ is a measure of negative E&S issues (to be described in the next section). *Spillover* is the key explanatory variable in the empirical analysis; it is a weighted average of E&S of firms that are geographically "close" to the focal firm i. Firms that are closer to firm i, in terms of either directors or headquarters geographic proximity, are assigned larger weights in their influence. We include $Spillover^{HQ}$ as one of the control variables in the regressions. This is because, as we show in Appendix A, a relatively large fraction of directors in our sample are located near the firm headquarters, one may wonder whether the spillover effect in the baseline analysis in fact arises from headquarters proximity rather than director proximity.

4. Empirical evidence for geographic spillover of director knowledge

4.1 Data and summary statistics

We first start with the universe of Russell 3000 firms. For these firms, we obtain the locations (in ZIP codes) of headquarters from the Software Repository for Accounting and Finance.[17] We use the ZIP codes disclosed by the directors (as insiders) to the SEC to identify their locations; these ZIP codes are obtained from LSEG (formerly Thomson Reuters) Insider Filing Data Files. The ZIP codes are then converted into FIPS county codes using ZIP-FIPS crosswalks[18] There are two potential concerns related to using these ZIP codes to identify director locations. The first concern is about whether these ZIP codes correspond to the directors' residential locations. Cumming et al. (2024) manually verify a random sample of the ZIP codes reported by the insiders in the Insider Filings Data against *PeopleFinders*; they find that the reported ZIP codes correspond to (or are near) the residential locations. Thus, we believe that the reported ZIP codes of the directors in our sample likely reflect their residential locations. The second concern is about whether there is mis-reporting of ZIP code information. To the extent that that there could be severe legal consequences if the directors misreport or falsely information in the SEC filings, we can reasonably expect that the ZIP codes (and other information) in the Insider Trading Files are accurate. Any minor discrepancies should not be systematic and should not affect how we identify the director locations, especially when we aggregate the ZIP codes to FIPS county levels.

Following Derrien et al. (Forthcoming), we examine E&S incidents, instead of E&S ratings, and source them from RepRisk. For each firm-year, we calculate *Env* and *Soc* as the total number of "Environment" and "Social" issues, respectively.[19] We also calculate *E&S* as the sum of Env and Soc. We assign a value of zero for the year if there is no record

[17] See https://sraf.nd.edu/sec-edgar-data/10-x-header-data/. We thank Professor Loughran and Professor McDonald for making the data available.

[18] The ZIP code information is available at https://data.world/crosswalks/fips-to-zip-code.

[19] See Appendix A for more details about the definitions of these variables.

in RepRisk.[20] We exclude issues under "Governance" category due to concerns that those in commercial databases may not reflect the typical corporate governance issues in academic studies (e.g. Hong, Kubik, and Scheinkman 2012; Krüger 2015; Dai, Liang, and Ng 2021), thereby exhibiting empirical patterns different from other CSR dimensions (e.g. Hong, Kubik, and Scheinkman 2012; Dyck et al. 2019).

From Compustat, we construct a number of control variables. Following Serafeim and Yoon (2023), we include log (Total assets), Market-to-book ratio, Leverage, Return on assets, Capital expenditure, Selling, general, and administrative expenses, Advertising expenses, R&D expenses.[21] Besides, to control for spillover among industry peers (e.g. Cao, Liang, and Zhan 2019 on product market peers), we include the mean outcome of nonlocal industry peers, i.e., firms in the same Fama-French 48 industry but outside the state of the focal firm. To control for spillover along the supply chain (Dai, Liang, and Ng 2021; Darendeli et al. 2022; Schiller 2018; Bisetti, She, and Zaldokas 2025), we also calculate the mean outcome of suppliers and customers using the Customer Segments from Compustat. Combining all the data sources, the baseline sample contains N = 30,280 firm-year observations, with 3,948 distinct firms over 2007-2022. Appendix A contains definitions of variables and some additional summary statistics of the baseline sample and the underlying director sample.

Table 1 reports the summary statistics of the baseline sample. Panel A–B show the summary statistics while Panel C presents the correlation matrix among variables. Panel A shows that E&S and its components are positively skewed: more than 75% of the firm-year do not have E&S incidents, resulting in a mean of 1.735 incidents per year. *Spillover* has a mean of 240.68 E&S incidents. Recall that *Spillover* is essentially the sum of *E&S* of surrounding firms, weighted by the degree of director overlap at the county level. The higher average of *Spillover* compared to that of *E&S* suggests a considerable degree of director overlap. Meanwhile, $Spillover^{HQ}$ (i.e., the sum of *E&S* for other firms headquartered in the same county) has an average of 61.46 for E&S incidents.

[20] Focusing on the largest 3000 firms (i.e., Russell 3000 firms) reduces the likelihood that a firm having negative E&S issues but not recorded by RepRisk. Nonetheless, our results are robust if we use the universe of Compustat firms.

[21] All financial ratios are winsorized at the 1% and 99% tails. See Appendix A for detailed definitions of these variables.

[Insert Table 1 here.]

4.2 Econometric specification

In our baseline analysis, we test H1 by estimating the following regression model:

$$y_{it+1} = \alpha + \beta Spillover_{it} + \gamma X_{it} + \varepsilon_{it+1}, \tag{5}$$

where y_{it+1} is *E&S*, *Env*, or *Soc*. $Spillover_{it}$ is director spillover the type of issues that corresponds to y_{it+1}. X_{it} contains $Spillover^{HQ}$ (headquarters spillover for the type of issues that corresponds to y_{it+1}) and control variables described in Section 3. We control for fixed effects at the level of firm, state-by-year, and industry-by-year for the 48 Fama-French industries, and cluster standard errors at the firm level. In all the regressions, we standardize the outcome variables and all spillover measures to facilitate interpretation of coefficients.

4.3 Baseline regression results

Table 2 reports the coefficient estimates of Equation (5). In Columns (1), (5), and (9), Spillover has significantly positive coefficients of 0.094, 0.050, and 0.102 in predicting *E&S*, *Env*, and *Soc* incidents, respectively. With *Spillover* standardized, the coefficients represent the impacts of one standard deviation increase and are economically significant compared with the averages of *E&S*, *Env*, and *Soc* (1.735, 0.654, and 1.081, respectively). We also note that including $Spillover^{HQ}$ in the regression does not render *Spillover* insignificant. For other control variables, the positive significant coefficient of *log (Total assets)* indicates that a larger firm, plausibly with more operations, has more ESG incidents. The negative significant coefficient of *Return on assets* is consistent with Ahn, Patatoukas, and Skiadopoulos (2024) that more profitable firms can better improve ESG performance, thus more likely to reduce E&S incidents. Non-local industry peers and suppliers/customers have insignificant coefficients. It is possible that our array of fixed effects is sufficient in capturing these effects.

[Insert Table 2 here.]

4.4 Controlling for common social networks and social connectedness

4.4.1 Common social networks

Fracassi (2017) finds that common social networks (CSN) among directors can significantly affect corporate policies. It is unclear whether the geographic spillover effect manifests among nearby directors only through local CSN. To study this possibility, we follow Fracassi (2017) and identify CSN from BoardEx based on current employment (CE), past employment (PE), education (ED), and other activities (OA).[22] Then we re-construct the weight in Equation (3) by excluding directors in firm i' who are in the same CSN as those in the focal firms i and create a new spillover measure, $Spillover^{Excl\ CSN}$. This measure only considers spillover when directors between two firms do not share any of the networks (CE, PE, ED, OA). We then replace *Spillover* by $Spillover^{Excl\ CSN}$ in Equation (5). If the spillover effect only manifests through common social networks locally, we should expect $Spillover^{Excl\ CSN}$ to be insignificant.

Columns (2), (6), and (10) of Table 2 show that the coefficients of $Spillover^{Excl\ CSN}$ are still significantly positive. Comparing with *Spillover* in Columns (1) , (5), and (9), the spillover effect does not weaken a lot even after excluding CSN, suggesting significant social interactions among directors beyond the previously identified social networks. As our objective is to examine the impact of geographic spillover, be it through common social networks or general interactions, we report the results using *Spillover* for the rest of the paper.

4.4.2 Social connectedness

An alternative explanation is that directors share similar social values and act similarly without direct interaction, which we label it as social spillover effect. This explanation suggests that the spillover effect need not depend on physical distance. If directors with similar social values also happen to reside in proximate regions, which is possible, this will result in a spurious geographic spillover effect.

[22] Specifically, two directors are in (a) Current Employment (CE) network if they work in the same company and sit together either on the board of directors or on the top management group; (b) Past Employment (PE) network if they worked in the same company or sat together either on the board of directors or on the top management group in the past; (c) Education (ED) network if they went to the same school and graduated within one year of each other; (d) Other Activities (OA) network if they share membership in clubs, organizations, charities, and had active roles in them.

To address this alterative explanation, we employ the Social Connectedness Index (SCI) from Facebook which proxies the relative probability of a friendship link between users in different county-pairs:[23]

$$SCI_{k,k'} = \frac{Number\ of\ Facebook\ Connections_{k,k'}}{Number\ of\ Facebook\ Users_k \times Number\ of\ Facebook\ Users_{k'}}. \tag{6}$$

If counties with similar social norms are more connected online,[24] a higher *SCI* represents a shorter "social distance" between users. We calculate $Spillover^{SCI}$ by replacing the indicator function $I\{k = k'\}$ in Equation (1) by $SCI_{k,k'}$ just defined. $Spillover^{SCI}$ is larger when firms with directors in more socially connected counties have more E&S incidents.

Columns (3), (7), and (11) of Table 2 present results when $Spillover^{SCI}$ is used as the explanatory variable. $Spillover^{SCI}$ is significantly positive across specifications, suggesting that social connection among directors' counties has a positive spillover effect. Columns (4), (8), and (12) also include *Spillover*, $Spillover^{HQ}$ and $Spillover^{HQ\ SCI}$ (the *SCI* version of $Spillover^{HQ}$). *Spillover* for *E&S* and *Soc* are still significantly positive while *Spillover* for *Env*, as a component, is insignificant in Column (8). The results suggest that spillovers based on geographic proximity among directors and social connectedness among counties are distinct effects.

Overall, the results in this section provide strong support of H1 on the geographic proximity spillover of E&S incidents through directors and show that the spillover effect is beyond the potential impacts from headquarter proximity, industry peers, supply chain, common social networks and social connectedness.

5. Identifying peer effects

The reflection problem posed by Manski (1993) highlights the difficulty of identifying peer effects: peers may have similar behavior/outcomes due to (a) contextual effects, (b) endogenous

[23] Data and other details can be found in: https://dataforgood.facebook.com/dfg/docs/methodology-social-connectedness-index. SCI has been used in several recent studies to measure social connectedness among regions (e.g., Au, Dong, and Zhou 2024; Bailey et al. 2018; Griffin, Kruger, and Mahajan 2024; Peng et al. 2023).

[24] For example, Griffin, Kruger, and Mahajan (2024) find evidence that frauds in COVID relief program exhibit systematic patterns along social connections and social media groups.

effects, or (c) correlated effects. In our context, these effects can be described as (a) directors with similar attitudes towards E&S have a preference to reside in proximate regions; (b) there are genuine peer influences, that is, E&S practices are causally affected by peer directors; (c) there are common unobserved shocks such as state-level policies simultaneously affecting all firms headquartered in the same state.

In this section, we adopt three approaches to tackling the above-mentioned issues. First, we exploit the nature of partially overlapping networks and derive an instrumental variable based on indirect peers. In our second and third approaches, we examine exogenous shocks as pointed out by Leary and Roberts (2014) that shocks exogenous to peer groups can tackle the concern of contextual and correlated effects. As such, our second approach examines the impact of COVID lockdown that severely reduces the interaction of directors with nearby peers. Third, we explore the initiation of Refinitiv ASSET4 ESG ratings that brings shocks to directors and affects their attitude towards CSR policies.

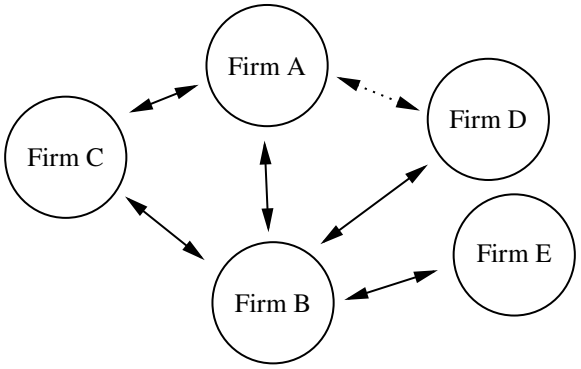
5.1 An instrumental variable approach for identification

Our instrumental variable approach exploits the so-called partially overlapping network (Bramoullé, Djebbari, and Fortin 2009; De Giorgi, Pellizzari, and Redaelli 2010). The idea is to exploit the fact that among the direct peers of the direct peers, some may not be the direct peers of the focal firm; these firms are called the "indirect peers" of the focal firm.[25]

The hypothetical example in Figure 2 illustrates how we identify the indirect peers for each focal firm. In this figure, suppose Firm A is the focal firm. Firm B is a direct peer of Firm A; Firm B itself has other direct peers, Firms C, D, and E (direct peer relationships are indicated by the solid arrows). It is possible that Firm B's direct peers are Firm A's direct peers, such as Firm C in the figure. On the other hand, while Firm D is not Firm A's direct peer, they could be in the same industry, or their headquarters are in the same state, or they are in a supply-chain relationship (these relationships are indicated by the dashed arrow). In other words, Firm D is related to Firm A not only through Firm B but also through other relationships. Finally, we consider Firm E as an indirect peer of Firm A because Firm E is related to Firm A only through

[25] Recall that in our context, direct peers of focal firm i are the firms having director overlaps in at least 1 county with firm i.

Figure 2: A hypothetical example to illustrate the identification of indirect peers



Note: Firm A is the focal firm. The solid arrows indicate direct peer relationships. The dashed arrow indicates firms being in the same industry or in a supply-chain relationship, or their headquarters being in the same state.

Firm B.

Formally, let i' be the index of the direct peers (Firm B in the figure) of focal firm i (Firm A in the figure) and i'' be the index of the direct peers of firm i' (Firms C, D, and E in the figure). We consider firm i'' as firm i's indirect peer when two conditions are satisfied: (a) Firm i'' and firm i are neither direct peers (this would exclude Firm C in the figure), nor in the same Fama-French 48 industry and their headquarters are not in the same state, nor in a supply-chain relationship (this would exclude Firm D in the figure); (b) Firm i'' and firm i' are in the same Fama-French 48 industry and their headquarters are in the same state.[26] The first condition is to avoid any correlated effects from industry-level, state-level, or supply-chain common shocks; the second condition is to limit the number of indirect peers —- otherwise a focal firm can have half of the universe of our sample as indirect peers.

Empirically, for each direct peer firm i', we use the geographic proximity weight between firm i' and the set of indirect peer firm i'', and E&S incidents of the set of firm i'' to calculate a spillover measure as $Spillover(i')$.[27] Then the instrument for the spillover measure of focal firm i, IV_i, is constructed as the average of $Spillover(i')$ of all direct peer firms of firm i. In

[26] We further require that the indirect peer firms are Russell 3000 firms. Our results also hold qualitatively if we modify condition two to either indirect peers as being direct peers of direct peers and in the same industry of the direct peers; or indirect peers as being direct peers of direct peers and in the same industry and having headquarters in the same county of the direct peers. The key to identifying indirect peers is that they should be outside of the circle of the focal firm and yet they can exert impact through direct peers. Further restricting indirect peers by industry and headquarters can help us better narrow down a group of indirect peers that have stronger influence on direct peers, thereby enhancing the power of the instrumental variable.

[27] In other words, we apply Equations (1) and (3) using geographic proximity weights for the focal firm i's direct peers i' and their direct peers i'' (which are the focal firm's indirect peers), i.e., $w_{i'i''}$.

other words, IV_i exploits information about E&S incidents of firm i's indirect peers and the geographic proximity of directors between firm i's direct peers and indirect peers. To the extent that indirect peers may directly affect direct peers but not the focal firms, we argue that IVi can serve as a valid instrument for *Spillover*.

Table 3 reports the two-stage least squares (2SLS) regression results. Column (1) shows that fitted *Spillover* has a significantly positive coefficient in predicting next year *E&S*. Columns (3) and (5) show similar results for *Env* and *Soc*, respectively. The F-statistics for weak identification are highly significant across specifications and the instrumental variable is significantly positively related to *Spillover* in the first stage regressions in Columns (2), (4), and (6). Overall, the 2SLS results suggest that our baseline results still hold after considering the identification issues mentioned at the beginning of this sub-section.

[Insert Table 3 here.]

In terms of economic significance, based on our 2SLS results, a one standard-deviation higher *Spillover* (based on E&S) leads to a 0.07 standard-deviation increase in the E&S incidents of the focal firms. With the standard deviation of E&S incidents equal to 9.254 in Table 1, the impact translates to 0.648 ($= 0.07 \times 9.254$) more E&S incidents for the focal firms. The impact is considerable given that the average number of E&S incidents is only 1.735 and more than 75% of firms do not experience any E&S incidents in a year.

5.2 Mobility restriction from COVID-19 lockdown

Interpersonal interaction is an important channel for information exchange, with the mobility of people a crucial facilitator. For example, the availability of direct flights and high-speed trains facilitates investors' in-person firm visits because communication and information acquisition are more effective on-site than other means (e.g. Bernstein, Giroud, and Townsend 2016; Chen et al. 2022). In year 2020, as a response to the COVID-19 pandemic, lockdown policies are implemented across the U.S. and interpersonal physical contacts are severely reduced. Such an adverse shock on mobility should disrupt information acquisition process that used to be face-to-face. Studies find that the COVID-19 lockdown has severely affected mutual funds that rely

more on physical interactions for information and hence their performance on local stocks (Bai and Massa 2024; Lee 2022). In our context, if face-to-face interactions play an important role in the exchange of knowledge and experience on ESG practices, we should expect the director spillover effect to be weakened when mobility is obscured during lockdown. While virtual meetings via Teams/Skype/Zoom are used as substitutes for in-person meetings, the degree of information acquisition and exchange is still severely reduced (Bai and Massa 2024). Therefore, we employ the lockdown as an event that reduces information exchange among directors.

To capture the degree of lockdown, we modify the geographic proximity weights in Equation (1):

$$\widetilde{w}_{ii'} = \sum_{k=1}^{K}\sum_{k'=1}^{K} \frac{F_{ik}F_{i'k'}}{\sqrt{[\sum_{m=1}^{K}(F_{im}^2)][\sum_{m=1}^{K}(F_{i'm}^2)]}} \times \frac{I\{k=k'\}}{\sqrt{L_k L_{k'}}}. \tag{7}$$

Specifically, we scale the distance function $I\{k = k'\}$ by $\sqrt{L_k L_{k'}}$, where L_k and $L_{k'}$ are categorical variables indicating lockdown stringency: $L = 1$ for the least restrictive region (i.e., easiest to move around) and $L = 4$ for the most restrictive region. Thus, the geographic proximity weight is smaller when the directors are subject to more stringent lockdown. We can interpret that directors have larger "effective distance" when lockdown is more stringent.

We use two variables to measure lockdown stringency. The first is Lockdown Stringency Index from Oxford Covid-19 Government Response Tracker, which measures the stringency of state-level lockdown policies.[28] The second is Google mobility trends (also known as Community Mobility Reports), which measures the reduction of mobility in pandemic compared with the pre-pandemic average at a county-level.[29] We use $\widetilde{w}_{ii'}$ and recompute spillover for year 2020, and estimate the following regression model:

$$\begin{aligned} y_{it+1} = {} & \alpha + \beta_1 Spillover_{it} + \beta_2 (Spillover_{it} - Spillover_{it}^{Lockdown}) \times I\{Year_t = 2020\} \\ & + \gamma X_{it} + \varepsilon_{it+1}, \end{aligned} \tag{8}$$

[28] From https://github.com/OxCGRT. This database has been widely used in studies regarding government responses to COVID-19, e.g. Hale et al. (2021).

[29] From https://github.com/GoogleCloudPlatform/covid-19-open-data. This database has been widely used in studies regarding mobility restrictions during the pandemic, e.g. Oh et al. (2021).

where $I\{Year_t = 2020\}$ indicates year 2020 and $Spillover_{it}^{Lockdown}$ is either $Spillover_{it}^{Stringency}$ or $Spillover_{it}^{Mobility}$. The coefficient of ($Spillover_{it} - Spillover_{it}^{Lockdown}$) captures the impact of increase in effective distance on *Spillover*. If lockdowns significantly reduce the spillover effect, we should expect $\beta_2 < 0$.

Table 4 presents the regression results of Equation (8). In Column (1), an increase of ($Spillover_{it} - Spillover_{it}^{Stringency}$) has a significantly negative impact (coefficient = –0.029) on *E&S* incidents in 2021. Column (2) reports the results using Google mobility trends and shows that ($Spillover_{it} - Spillover_{it}^{Mobility}$) also has a negative and significant coefficient. We find qualitatively similar results for Env and Soc in Columns (3) to (6).[30] Overall, the spillover effect in the lockdown period is significantly weaker. In particular, more stringent lockdowns are related to weaker spillover effects. Thus, the findings support our conjecture that the geographic proximity spillover of managerial knowledge on ESG policies manifests through face-to-face interactions among directors.

[Insert Table 4 here.]

5.3 Initiation of Refinitiv ASSET4 ESG rating

As we hypothesize in H2, stakeholders can exert pressure on directors to learn from others on E&S-related practices, leading to stronger spillover of E&S incidents. To test H2, we exploit the external shocks imposed by the initiation of Refinitiv ASSET4 ESG rating. Theoretically, models on heterogenous investors (Pedersen, Fitzgibbons, and Pomorski 2021; Goldstein et al. 2022) suggest that investors with ESG preference can have significant impacts on asset prices over traditional investors who are financially focused. Aghamolla and An (2023) and Xue (2023) show that the presence of ESG information will modify firm investment incentive to tailor investors' preference and stakeholders' pressure for ESG. Empirically, Darendeli et al. (2022) find that suppliers with low ratings experience a drop in contracts and corporate customers

[30] Another possible explanation is that the lockdown temporarily alters socio-economic factors that affect directors' perception on ESG incidents. To explain our empirical results under this alternative, nearby regions with more stringent lockdown policies/effects have more weakened preference on ESG, thus weakening the director spillover effect without involving less actual inter-personal interactions. However, regions with more stringent lockdown are more likely democratic-leaning and have strong ESG preference. Therefore, it is unlikely that these regions experience a temporary weakened preference for ESG during the lockdown.

after CSR information becomes available. Lu (2024) finds that firms with transparent ESG information increase ESG investments. Therefore, we expect that firms with more available ESG information are subject to more scrutiny on ESG performance and are pressured to adopt changes to ESG-related practices, thus enhancing directors' motivations to learn from nearby peers and leading to a stronger director spillover effect.

We use the staggered initiation of Refinitiv ASSET4 ESG rating as the event of increased ESG information for several reasons. First, Refinitiv ASSET4 is a popular source of ESG information among industry partitioners (see Section 3.1 of Darendeli et al. 2022 for the related discussion) by providing a comprehensive coverage of ESG performance for different pillars and sub-dimensions for stakeholders to scrutinize. Second, the staggered inclusion of firms by Refinitiv ASSET4 is unlikely to be a choice of the firms, thus mitigating the concern that the coverage is the result of benefit-cost trade-off for voluntary ESG disclosure (e.g. Aghamolla and An 2023). Third and most importantly, the initiation is likely to only affect the motivation of directors of the focal firm, rather than affecting other firms in the same region. Darendeli et al. (2022) and Lu (2024) also exploit the implications of Refinitiv ASSET4 rating expansion.

Empirically, we create *ASSET4Initiation* as a dummy variable for the months after a firm is covered by Refinitiv ASSET4. As discussed, we expect a stronger director spillover effect after a firm is covered by ASSET4. Table 5 reports results when we interact Spillover with *ASSET4Initiation* in regressions. The interaction terms are significantly positive in all columns, thus supporting our conjecture. Moreover, ASSET4Initiation has a significant and negative coefficient, suggesting that coverage by ASSET4 does pose pressure on firms to discipline and reduce E&S incidents.

[Insert Table 5 here.]

6. Moderating effects on director spillover

In this section, we further test H2 by exploring two settings in which directors are under more pressure for improving E&S practices.

6.1 Institutional investors

Institutional investors can exert significant impact on corporate policies and they believe that firms good at E&S dimensions will outperform in the long-run (Edmans, Gosling, and Jenter 2024). Research has found that short-term investors tend to push firms for short-term profit maximizing changes, while long-term investors are more likely to monitor firms and support changes that benefit shareholders in the long-run (e.g. Bushee 1998; Edmans and Manso 2011; Eccles, Ioannou, and Serafeim 2014; Cremers, Pareek, and Sautner 2020). Because ESG incidents are costly to the firms (e.g. Krüger 2015; Serafeim and Yoon 2022, 2023; Akey et al. 2023; Derrien et al. Forthcoming) but it requires time and efforts to implement and monitor ESG-related practices, long-term institutional investors should be more likely to push firms for ESG improvement than those with a short horizon. Given such pressure, directors should be more motivated to learn from peers, leading to a stronger spillover effect.[31]

Empirically, we partition institutional ownership from Thomson Reuters 13F database into three types based on the classifications of Bushee (1998, 2001) according to portfolio turnover and diversification: dedicated, quasi-indexer, and transient investors.[32] Dedicated investors have concentrated and long-term holdings in a small number of stocks. Quasi-indexers have diversified holdings with low turnover, mostly from index benchmarking objective. Transient investors hold a diversified portfolio with a high turnover. Therefore, we expect that dedicated investors, as long-term investors, exert influence by monitoring the firms and transient investors are pushing the management for short-term profits. The spillover effect is expected to be stronger with more dedicated ownership and weaker with more transient ownership. The effect by quasi-indexers, however, is unclear. On the one hand, they mostly track benchmark indices and are regarded as passive and not incentivized for active monitoring from cost-benefit considerations (Chen, Harford, and Li 2007). On the other hand, Appel, Gormley, and Keim (2016) find that passive investors can improve the CSR performance of the holding firms.

[31] It is also possible that long-term investors are attracted to invest in firms with good E&S practices. However, the initial reason for them to invest does not matter in this analysis because the criterion is that they should engage with firms to achieve long-term goals, rather than how they select firms. Moreover, with spillover as the outcome variable, it is unclear why long-term investors should have a special preference on firms experiencing high spillover effect.

[32] We obtain the classification information from https://accounting-faculty.wharton.upenn.edu/bushee/.

Table 6 reports the regression results when we interact *Spillover* with indicator variables on high ownership from dedicated, quasi-indexer, or transient investors based on medians. On *E&S* incidents, Column (1) shows that higher dedicated ownership is significantly related to stronger spillover effect: the interaction term *Spillover* × *High_Dedicated* has a positive and significant coefficient of 0.044. On the contrary, the spillover effect with high transient ownership is significantly lower: *Spillover*×*High_Transient* has a significantly negative coefficient of -0.076. On *Env* and *Soc* incidents in Columns (2)–(3), respectively, we also find a stronger spillover effect for high dedicated ownership and a weaker effect for high transient ownership. Moreover, the magnitudes of coefficients for interaction terms are sizable compared with those of *Spillover*. For example, the coefficient of *Spillover* is 0.130 while that of *Spillover* × *High_Dedicated* is 0.044 in Column (1). Overall, the results are consistent with our conjecture that the monitoring efforts from institutional investors moderate directors' motivation to learn and implement E&S-related practices.

[Insert Table 6 here.]

6.2 Local stakeholder effect from political leaning

We explore another moderating effect based on local political leaning. Research has found that Democrats are more likely to show support for ESG-related deeds than Republicans (e.g. Di Giuli and Kostovetsky 2014; Bernstein et al. 2022). Generally, such ESG preferences may manifest through local stakeholders via individual investors who tend to hold local stocks (Grinblatt and Keloharju 2001; Seasholes and Zhu 2010), or via customers and employees because firms tend to have a strong local customer base and have employed locally around the headquarter region. For example, individuals in Democratic regions are more inclined than those in Republican regions to add ESG funds to their 401(k) investment menus following ESG scandals in the local region (Tian and Shi 2023). Duan, Li, and Michaely (2023) find that consumer store visits drop more for Democratic than Republican counties after negative ESG incidents on the company. Bode, Singh, and Rogan (2015) and Cen, Qiu, and Wang (2023) find that corporate social responsibility matters for employee retention. Thus, firms in regions with Democrats-aligned values are more likely to be under pressure by local stakeholders to improve

the ESG performance, which in turn motivates directors to learn from nearby peers, leading to a stronger spillover effect.

We measure political leaning based on county-level Presidential election results and define a dummy variable *Blue* = 1 if the firm's headquarter is located in a Democratic county, and zero otherwise.[33] Then we interact *Blue* with *Spillover* and report the regression results in Table 7. Columns (1) and (3) show that *Spillover* × *Blue* are significantly positive for both E&S and Soc incidents, respectively. While the interaction term is positive but insignificant for *Env* incidents in Column (2), the level variable (i.e., *Spillover*) is also insignificant. We notice that the coefficients of *Spillover* are much smaller when compared with those in Table 2. Moreover, *Blue* is insignificant, somewhat counterintuitive to Democrats' pro-ESG preference. It is possible that the lack of time-series variation of Blue plays a role because around 75% of firms do not experience a change in political leaning. *Blue* is insignificant because it is mostly captured by firm fixed effects. The multi-collinearity between *Spillover* and *Spillover*×*Blue* may result in weak coefficients for both variables. Despite these concerns, we still find supporting evidence of political leaning of stakeholders in shaping the spillover effect.

[Insert Table 7 here.]

7. Conclusion

Integrating CSR into corporate policies requires considerable knowledge input from the board. We hypothesize that directors may learn, imitate or herd from peers through local knowledge exchange with nearby directors of other firms. To measure the extent of geographic proximity of directors across firms, we propose a novel spillover measure based on their location overlap, which is distinct from the commonly used headquarter proximity in the literature. Using E&S incidents to proxy for the underlying CSR practices, we find that E&S incidents of a firm are significantly affected by firms with overlaps in directors' locations. In contrast, geographic proximity between headquarters does not relate to E&S incident spillover. The geographic spillover effect cannot be explained by existing spillover mechanisms in the corporate finance

[33] We obtain the county-level election data from https://electionlab.mit.edu/data.

literature along the dimensions of common social network, industry, and supply chain. Nor can it be explained by social connectedness among regions.

To enhance identification, we construct an instrumental variable based on the spillover from indirect peers and confirm our results under two-stage least square regressions. We also examine the impact of external shocks and find a weaker spillover effect when the face-to-face interactions among directors are obscured during the COVID-19 pandemic and a stronger effect when the firm is under more scrutiny after CSR rating initiation. We find further supportive evidence when we investigate moderating effects by institutional investors and local stakeholders who demand better CSR performance.

Overall, our results uncover a new spillover mechanism through which corporate policies can propagate across firms. Our findings contribute to the understanding of how firms formulate CSR-related policies, and corporate policies in general, through local managerial knowledge transfer and shed light on research using CSR incidents from the perspective of geographic spillover. Our results also demonstrate how non-economically linked firms have an impact on corporate outcomes.

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A. Data appendix

A.1 Definitions of variables

Table A shows the definitions of the variables used in our analysis and the respective data sources.

Table A: Definitions of variables

Variable	Definition	Data Source
Env	Number of negative Environment issues, including: Animal mistreatment; Climate change, GHG emissions, and global pollution; Impacts on landscapes, ecosystems, and biodiversity; Local pollution; Overuse and wasting of resources; Waste issues (6 types)	RepRisk
Soc	Number of negative Social issues, including: Social Child labor; Discrimination in employment; Forced labor; Freedom of association and collective bargaining; Human rights abuses, corporate complicity; Impacts on communities; Local participation issues; Occupational health and safety issues; Poor employment conditions; Social discrimination (10 types)	RepRisk
E&S	Sum of Env and Soc	RepRisk
Spillover	Spillover measure of negative E&S issues, based on geographic proximity of firms' directors	RepRisk, LSEG (formerly Thomson) Insider Filing
$Spillover^{HQ}$	Spillover measure of negative E&S issues, based on geographic proximity of firms' headquarters	RepRisk, Software Repository for Accounting and Finance
log (Total assets)	Total assets in log	Compustat
Market-to-book ratio	Market capitalization/ Total assets	Compustat
Leverage	(Long-term debt + Debt in current liabilities)/ Total assets	Compustat
Return on assets	Operating income before depreciation/ Total assets	Compustat
Capital expenditure	Capital expenditure/ Property, plant, and equipment	Compustat
Selling, general, and administrative expenses	Selling, general, and administrative expense/ Sales	Compustat
Advertising expenses	Advertising expenses/ Sales	Compustat
R&D expenses	R&D expenses/ Sales	Compustat
Nonlocal industry peers average	Mean of the outcome variable among all firms of the same Fama-French 48 industry but not in the same state	RepRisk, Compustat
Suppliers and customers average	Mean of the outcome variable among the focal firm's suppliers and customers	RepRisk, Compustat

A.2 Additional summary statistics

Tables B and C show some additional summary statistics for the baseline sample. Table B shows the top ten counties with the largest average numbers of firm headquarters and directors (within our baseline sample during the sample period). It shows that there is a high concentration of firm headquarters and directors in a relatively small number of counties. Specifically, within the baseline sample, there are 3948 distinct firms and 23659 distinct directors; while there are

more than 3200 counties in the U.S., firm headquarters and directors are located in only 448 and 777 distinct counties respectively. Among these counties, New York County is the most "popular" location for firm headquarters and directors and accounts for about 18% of the firm headquarters and 4% of the directors within the baseline sample.

Table B: Top ten counties with the largest average numbers of firm headquarters and directors within the baseline sample

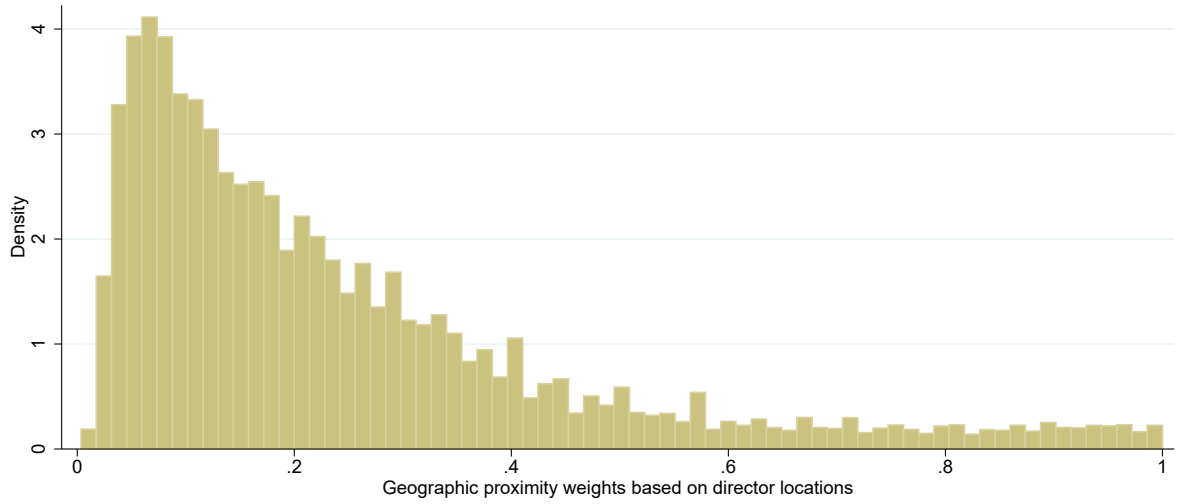
Ranking	County, State	Average number of firms during the sample period	Ranking	County, State	Average number of directors during the sample period
1	New York County, New York	725	1	New York County, New York	981
2	Santa Clara County, California	593	2	Santa Clara County, California	615
3	Harris County, Texas	570	3	Harris County, Texas	561
4	Middlesex County, Massachusetts	511	4	Middlesex County, Massachusetts	475
5	Cook County, Illinois	394	5	Cook County, Illinois	447
6	Los Angeles County, California	380	6	Los Angeles County, California	408
7	Dallas County, Texas	338	7	San Mateo County, California	323
8	San Mateo County, California	294	8	Dallas County, Texas	314
9	San Diego County, California	273	9	San Diego County, California	292
10	Hennepin County, Minnesota	272	10	Fairfield County, Connecticut	266

In Table C, the first row shows that in each firm-year, about half of the directors are located in the same county as that of the firm headquarters. The second row shows that, among the ~201K director-firm-year observations in the baseline sample, the average physical distance between the director county and the firm headquarters county is about 678.22 km and is consistent with the corresponding statistics of 880.8 km reported by Alam et al. (2014) based on ZIP codes from 2004 to 2007. Excluding those directors located in the same county as that of the firm headquarters, the third row shows that the average physical distance between the director county and the firm headquarters county becomes 1336.84 km. The huge distance comes from cases where the firm headquarters are in the west coast (such as California) while the directors are in the east coast (such as New York), vice versa. The fourth and fifth row show that in each firm-year, on average a firm's directors are located in 3.86 different counties and the firm has about 500.36 peer firms. While this average seems quite high, it could be justified by the concentration of directors in certain counties (as shown in Table B). The sixth row shows that in each county-year, there are about 21.29 directors; but the distribution is quite skewed since the median is only 4 directors. Finally, the sixth row shows that among the ~15M focal firm-peer firm pair-year observations, the mean geographic proximity weights based on director locations (calculated by Equation (1) is about 0.25; Figure A shows the corresponding distribution of these weights.

Table C: Additional summary statistics for the baseline sample

Variable	Unit of analysis	N	Mean	S.D.	1st quartile	Median	3rd quartile
Share of directors with directory county equal to headquarters county	Firm-year	30280	0.49	0.3	0.25	0.5	0.75
Mean distance (in km) between director county and headquarters county	Director-firm-year	~201K	678.22	1118.01	0	23.75	1011.5
Mean distance between director county and headquarters county (conditional on different counties)	Director-firm-year	~102K	1336.84	1258.3	285.65	986.76	2011.78
Number of distinct director counties	Firm-year	30280	3.86	2.01	2	4	5
Number of peer firms	Firm-year	30280	500.36	320.32	247	450	730.5
Number of directors per county (among counties with at least 1 director)	County-year	7567	21.29	59.97	1	4	15
Geographic proximity weights based on director locations	Focal firm- peer firm pair-year	~15M	0.25	0.21	0.09	0.18	0.32

Figure A: Distribution of the geographic proximity weights based on director locations



Note: This figure shows the distribution of the geographic proximity weights based on director locations. The unit of observation is a focal firm-peer firm pair by year.

Table 1: Summary statistics

This table reports the summary statistics of the 30,280 observations used in the analysis. Panel A shows the summary statistics for the negative E&S issues (*E&S*, *Env*, and *Soc*) and the corresponding spillover measures. *Spillover* and $Spillover^{HQ}$ are the weighted averages of number of negative E&S issues of other firms according to directors and headquarters geographic proximity, respectively. Panel B shows the summary statistics for the control variables (their definitions are in Appendix A). Panel C shows the correlation coefficients of these variables, with coefficients that are significant at 5% level are in bold font. All financial ratios are winsorized at the 1% and 99% tails.

Panel A: Negative E&S issues and the corresponding spillover measures

Variable	Mean	S.D.	1st quartile	Median	3rd quartile
E&S	1.735	9.254	0.000	0.000	0.000
Env	0.654	4.022	0.000	0.000	0.000
Soc	1.081	6.143	0.000	0.000	0.000
Spillover (based on *E&S*)	240.683	251.640	61.627	152.727	338.197
Spillover (based on *Env*)	90.689	90.857	24.908	60.367	126.122
Spillover (based on *Soc*)	149.995	165.387	35.878	90.242	203.119
$Spillover^{HQ}$ (based on *E&S*)	61.461	105.236	2.000	15.000	62.000
$Spillover^{HQ}$ (based on *Env*)	22.335	41.752	0.000	5.000	21.000
$Spillover^{HQ}$ (based on *Soc*)	39.127	69.637	1.000	9.000	40.000

Panel B: Control variables

Variable	Mean	S.D.	1st quartile	Median	3rd quartile
log (Total assets)	7.233	1.803	5.915	7.124	8.413
Market-to-book ratio	2.235	1.988	1.196	1.614	2.514
Leverage	0.261	0.256	0.049	0.226	0.388
Return on assets	0.064	0.241	0.051	0.105	0.157
Capital expenditure	0.118	0.107	0.055	0.087	0.145
Selling, general, and administrative expenses	0.288	0.460	0.072	0.185	0.351
Advertising expenses	0.011	0.023	0.000	0.000	0.008
R&D expenses	0.167	0.560	0.000	0.000	0.072

Panel C: Correlation matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
(1) *E&S*	1.000																
(2) *Env*	**0.861**	1.000															
(3) *Soc*	**0.943**	**0.642**	1.000														
(4) *Spillover* (based on *E&S*)	**0.128**	**0.094**	**0.131**	1.000													
(5) *Spillover* (based on *Env*)	**0.122**	**0.097**	**0.120**	**0.967**	1.000												
(6) *Spillover* (based on *Soc*)	**0.128**	**0.091**	**0.133**	**0.990**	**0.922**	1.000											
(7) $Spillover^{HQ}$ (based on *E&S*)	**0.035**	**0.019**	**0.041**	**0.595**	**0.584**	**0.584**	1.000										
(8) $Spillover^{HQ}$ (based on *Env*)	**0.027**	**0.026**	**0.024**	**0.506**	**0.569**	**0.457**	**0.907**	1.000									
(9) $Spillover^{HQ}$ (based on *Soc*)	**0.037**	**0.013**	**0.047**	**0.595**	**0.541**	**0.609**	**0.968**	**0.771**	1.000								
(10) *log (Total assets)*	**0.336**	**0.290**	**0.316**	**0.192**	**0.200**	**0.182**	**0.087**	**0.094**	**0.076**	1.000							
(11) *Market-to-book ratio*	-0.004	**-0.030**	**0.013**	**0.073**	**0.022**	**0.099**	**0.051**	**-0.015**	**0.086**	**-0.242**	1.000						
(12) *Leverage*	**0.030**	**0.028**	**0.027**	**0.126**	**0.133**	**0.119**	**0.041**	**0.068**	**0.021**	**0.242**	**-0.026**	1.000					
(13) *Return on assets*	**0.054**	**0.040**	**0.055**	**-0.045**	**-0.027**	**-0.053**	**-0.034**	-0.006	**-0.048**	**0.341**	**-0.214**	**-0.031**	1.000				
(14) *Capital expenditure*	**-0.036**	**-0.050**	**-0.022**	0.008	0.007	0.008	**0.027**	0.011	**0.034**	**-0.172**	**0.196**	**-0.131**	**-0.105**	1.000			
(15) *Selling, general, and administrative expenses*	**-0.053**	**-0.059**	**-0.041**	**0.029**	-0.001	**0.044**	**0.006**	**-0.035**	**0.030**	**-0.275**	**0.227**	**-0.032**	**-0.324**	**0.141**	1.000		
(16) *Advertising expenses*	**0.038**	0.008	**0.051**	**0.132**	**0.116**	**0.136**	**0.057**	**0.031**	**0.067**	**0.020**	**0.088**	**0.029**	**0.055**	**0.050**	**0.163**	1.000	
(17) *R&D expenses*	**-0.047**	**-0.044**	**-0.041**	**0.024**	-0.007	**0.040**	-0.001	**-0.040**	**0.023**	**-0.304**	**0.241**	**-0.077**	**-0.556**	**0.120**	**0.287**	**-0.052**	1.000

Table 2: Director Spillover Effect on Negative E&S Issues — OLS Results

The dependent variable is next year aggregate number of negative E&S issues (*E&S*, *Env*, and *Soc*). *Spillover* is the weighted average of E&S incidents of other firms based on the geographic proximity of directors. $Spillover^{HQ}$ is the weighted average of E&S incidents of other firms headquartered in the same county. $Spillover^{Excl\ CSN}$ is a variant of *Spillover* by excluding directors who share common social networks (as in Fracassi 2017) as those in the focal firm. In $Spillover^{SCI}$ and $Spillover^{HQ\ SCI}$, we use the Social Connectedness Index (SCI) between two counties at which the directors and headquarters are located. In the regressions, the dependent variable and the spillover measures are all standardized (mean = 0, s.d. = 1). Control variables are defined in Appendix A. Standard errors clustered at the firm-level are reported in parentheses. Significance levels at 10%, 5%, and 1% are indicated by *, **, and ***, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Dependent variable:	*E&S*	*E&S*	*E&S*	*E&S*	*Env*	*Env*	*Env*	*Env*	*Soc*	*Soc*	*Soc*	*Soc*
Spillover	0.094***			0.044**	0.050***			0.020	0.102***			0.051**
	(0.028)			(0.020)	(0.015)			(0.016)	(0.035)			(0.024)
$Spillover^{Exc\ CSN}$		0.071***				0.043***				0.069***		
		(0.023)				(0.014)				(0.026)		
$Spillover^{SCI}$			0.120***	0.096***			0.067***	0.057**			0.125***	0.097**
			(0.037)	(0.035)			(0.021)	(0.024)			(0.046)	(0.041)
$Spillover^{HQ}$	-0.043	-0.034		0.002	-0.043**	-0.041**		-0.024	-0.048	-0.034		0.013
	(0.036)	(0.034)		(0.029)	(0.020)	(0.019)		(0.020)	(0.048)	(0.045)		(0.038)
$Spillover^{HQ\ SCI}$			-0.055	-0.060*			-0.037***	-0.026*			-0.068	-0.083*
			(0.034)	(0.031)			(0.014)	(0.013)			(0.050)	(0.045)
log (Total assets)	0.096**	0.096**	0.098**	0.097**	0.044**	0.045**	0.045**	0.045**	0.115**	0.116**	0.118**	0.118**
	(0.046)	(0.046)	(0.047)	(0.047)	(0.020)	(0.020)	(0.020)	(0.020)	(0.058)	(0.058)	(0.059)	(0.059)
Market-to-book ratio	0.008	0.008	0.008	0.008	0.004	0.004	0.004	0.004	0.010	0.010	0.010	0.010
	(0.006)	(0.006)	(0.006)	(0.006)	(0.004)	(0.004)	(0.004)	(0.004)	(0.007)	(0.007)	(0.007)	(0.007)
Leverage	0.004	0.006	0.004	0.002	-0.003	-0.002	-0.004	-0.004	0.009	0.012	0.010	0.007
	(0.023)	(0.023)	(0.022)	(0.023)	(0.018)	(0.018)	(0.018)	(0.018)	(0.025)	(0.025)	(0.025)	(0.025)
Return on assets	-0.047**	-0.047**	-0.048**	-0.048**	-0.047**	-0.048**	-0.047**	-0.047**	-0.039*	-0.039*	-0.041*	-0.042*
	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)	(0.022)	(0.022)
Capital expenditure	-0.016	-0.015	-0.015	-0.017	0.005	0.005	0.006	0.004	-0.028	-0.026	-0.027	-0.029
	(0.044)	(0.044)	(0.045)	(0.044)	(0.037)	(0.037)	(0.037)	(0.036)	(0.049)	(0.049)	(0.049)	(0.049)

Selling, general, and administrative expenses	0.004 (0.010)	0.005 (0.010)	0.005 (0.009)	0.004 (0.009)	0.003 (0.006)	0.003 (0.006)	0.003 (0.006)	0.003 (0.006)	0.005 (0.011)	0.006 (0.012)	0.005 (0.011)	0.004 (0.011)
Advertising expenses	-0.638 (0.550)	-0.637 (0.554)	-0.638 (0.549)	-0.646 (0.547)	-0.517 (0.322)	-0.516 (0.323)	-0.515 (0.322)	-0.516 (0.322)	-0.617 (0.685)	-0.615 (0.690)	-0.627 (0.683)	-0.638 (0.680)
R&D expenses	0.002 (0.008)	0.001 (0.008)	0.000 (0.007)	0.001 (0.008)	-0.003 (0.004)	-0.003 (0.004)	-0.004 (0.004)	-0.004 (0.004)	0.005 (0.010)	0.004 (0.009)	0.003 (0.009)	0.004 (0.009)
Nonlocal industry peers average	0.096 (0.229)	0.093 (0.229)	0.106 (0.226)	0.119 (0.224)	0.112 (0.310)	0.110 (0.310)	0.116 (0.303)	0.107 (0.307)	-0.030 (0.171)	-0.029 (0.172)	0.003 (0.163)	0.012 (0.162)
Suppliers and customers average	0.001 (0.006)	0.001 (0.006)	0.001 (0.006)	0.001 (0.006)	-0.001 (0.006)	-0.001 (0.006)	-0.001 (0.006)	-0.001 (0.006)	-0.001 (0.006)	-0.000 (0.006)	-0.001 (0.006)	-0.001 (0.006)
Firm fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State-by-year fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-by-year fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	30280	30280	30280	30280	30280	30280	30280	30280	30280	30280	30280	30280
R-squared	0.803	0.803	0.804	0.804	0.859	0.859	0.86	0.86	0.747	0.747	0.748	0.748

Table 3: Director Spillover Effect on Negative E&S Issues — 2SLS Results

The dependent variable in odd columns is next year aggregate number of negative E&S issues (*E&S*, *Env*, and *Soc*); the dependent variable in even column is *Spillover* (based on *E&S*, *Env*, or *Soc*). *IV – E&S*, *IV – Env*, and *IV – Soc* are the instruments for *Spillover* (based on *E&S*, *Env*, or *Soc* respectively). *Spillover* is the weighted average of E&S incidents of other firms based on the geographic proximity of directors. $Spillover^{HQ}$ is the weighted average of E&S incidents of other firms headquartered in the same county. $Spillover^{Stringency}$ and $Spillover^{Mobility}$ are constructed using geographic proximity weights that take into account COVID-19 lockdown in year 2020 either in different states (captured by the Lockdown Stringency Index, "Stringency") or in different counties (captured by the Google Mobility Trends, "Mobility"). $I\{.\}$ is an indicator variable. In the regressions, the dependent variable and the spillover measures are all standardized (mean = 0, s.d. = 1). Control variables are defined in Appendix A. Standard errors clustered at the firm-level are reported in parentheses. Significance levels at 10%, 5%, and 1% are indicated by *, **, and ***, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	*E&S*	*Spillover* (based on *E&S*)	*Env*	*Spillover* (based on *Env*)	*Soc*	*Spillover* (based on *Soc*)
Specification:	2nd stage	1st stage	2nd stage	1st stage	2nd stage	1st stage
Spillover	0.070**		0.049**		0.069*	
	(0.029)		(0.023)		(0.035)	
IV – E&S		0.177***				
		(0.009)				
IV – Env				0.181***		
				(0.008)		
IV – Soc						0.166***
						(0.010)
$Spillover^{HQ}$	-0.034	0.400***	-0.043*	0.363***	-0.034	0.406***
	(0.031)	(0.018)	(0.022)	(0.020)	(0.043)	(0.017)
log (Total assets)	0.096**	0.006	0.045**	0.007	0.115**	0.005
	(0.046)	(0.016)	(0.020)	(0.016)	(0.058)	(0.017)
Market-to-book ratio	0.008	0.002	0.004	-0.002	0.010	0.004
	(0.006)	(0.003)	(0.004)	(0.003)	(0.007)	(0.003)
Leverage	0.006	0.064*	-0.002	0.053	0.012	0.070*
	(0.023)	(0.036)	(0.018)	(0.036)	(0.025)	(0.037)
Return on assets	-0.046**	-0.002	-0.047**	-0.025	-0.039*	0.010
	(0.020)	(0.028)	(0.021)	(0.028)	(0.021)	(0.029)
Capital expenditure	-0.014	0.081	0.005	0.066	-0.025	0.086*
	(0.044)	(0.051)	(0.037)	(0.050)	(0.049)	(0.051)
Selling, general, and administrative expenses	0.005	0.028	0.003	0.024	0.006	0.029
	(0.010)	(0.019)	(0.006)	(0.018)	(0.012)	(0.019)
Advertising expenses	-0.634	0.054	-0.516	0.056	-0.611	0.066
	(0.554)	(0.703)	(0.323)	(0.678)	(0.691)	(0.714)
R&D expenses	0.001	-0.018	-0.003	-0.018	0.004	-0.017
	(0.007)	(0.019)	(0.004)	(0.019)	(0.009)	(0.019)
Nonlocal industry peers average	0.094	-0.055	0.111	-0.152	-0.029	0.046
	(0.229)	(0.263)	(0.310)	(0.231)	(0.172)	(0.292)
Suppliers and customers average	0.001	0.008	-0.001	0.006	-0.000	0.010
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.007)
Firm fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes
State-by-year fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-by-year fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	30280	30280	30280	30280	30280	30280
R-squared		0.851		0.849		0.851
F-statistic for weak identification	364.335		458.328		271.568	

Table 4: Impact of COVID-19 Lockdown

This table reports estimated coefficients of regression model (8). The dependent variable is next year aggregate number of negative E&S issues (*E&S*, *Env*, and *Soc*). *Spillover* is the weighted average of E&S incidents of other firms based on the geographic proximity of directors. $Spillover^{HQ}$ is the weighted average of E&S incidents of other firms headquartered in the same county. $Spillover^{Stringency}$ and $Spillover^{Mobility}$ are constructed using geographic proximity weights that take into account COVID-19 lockdown in year 2020 either in different states (captured by the Lockdown Stringency Index, "Stringency") or in different counties (captured by the Google Mobility Trends, "Mobility"). $I\{.\}$ is an indicator variable. In the regressions, the dependent variable and the spillover measures are all standardized (mean = 0, s.d. = 1). Control variables are defined in Appendix A. Standard errors clustered at the firm-level are reported in parentheses. Significance levels at 10%, 5%, and 1% are indicated by *, **, and ***, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	*E&S*	*E&S*	*Env*	*Env*	*Soc*	*Soc*
Spillover	0.089***	0.088***	0.047***	0.047***	0.098***	0.097***
	(0.027)	(0.026)	(0.014)	(0.014)	(0.034)	(0.033)
$(Spillover - Spillover^{Stringency}) \times I\{Year = 2020\}$	-0.029**		-0.022**		-0.024**	
	(0.012)		(0.010)		(0.011)	
$(Spillover - Spillover^{Mobility}) \times I\{Year = 2020\}$		-0.052**		-0.030**		-0.042*
		(0.022)		(0.014)		(0.023)
$Spillover^{HQ}$	-0.044	-0.046	-0.044**	-0.044**	-0.048	-0.051
	(0.036)	(0.036)	(0.020)	(0.020)	(0.048)	(0.050)
Nonlocal industry peers average	0.094	0.092	0.111	0.111	-0.031	-0.035
	(0.228)	(0.229)	(0.309)	(0.309)	(0.171)	(0.173)
Suppliers and customers average	0.001	0.001	-0.001	-0.001	-0.001	-0.001
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Other control variables	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes
State-by-year fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-by-year fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	30280	30280	30280	30280	30280	30280
R-squared	0.803	0.803	0.859	0.859	0.747	0.747

Table 5: Impact of ASSET4 Initiation

The dependent variable is next year aggregate number of negative E&S issues (*E&S*, *Env*, and *Soc*). *Spillover* is the weighted average of E&S incidents of other firms based on the geographic proximity of directors. $Spillover^{HQ}$ is the weighted average of E&S incidents of other firms headquartered in the same county. *ASSET4Initiation* takes the value of 1 for years on or after the firm is covered by ASSET4, and zero otherwise. In the regressions, the dependent variable and the spillover measures are all standardized (mean = 0, s.d. = 1). Control variables are defined in Appendix A. Standard errors clustered at the firm-level are reported in parentheses. Significance levels at 10%, 5%, and 1% are indicated by *, **, and ***, respectively.

	(1)	(2)	(3)
Dependent variable:	*E&S*	*Env*	*Soc*
Spillover	0.020	0.009	0.019
	(0.016)	(0.011)	(0.021)
Spillover × *ASSET4Initiation*	0.087***	0.054***	0.093***
	(0.019)	(0.012)	(0.022)
ASSET4Initiation	-0.138***	-0.069***	-0.165***
	(0.035)	(0.020)	(0.044)
$Spillover^{HQ}$	-0.051	-0.046**	-0.057
	(0.036)	(0.020)	(0.049)
Nonlocal industry peers average	0.019	0.073	-0.111
	(0.224)	(0.305)	(0.174)
Suppliers and customers average	0.002	-0.001	0.000
	(0.006)	(0.006)	(0.006)
Other control variables	Yes	Yes	Yes
Firm fixed-effects	Yes	Yes	Yes
State-by-year fixed-effects	Yes	Yes	Yes
Industry-by-year fixed-effects	Yes	Yes	Yes
Observations	30280	30280	30280
R-squared	0.805	0.86	0.750

Table 6: Moderating Effect by Institutional Ownership

The dependent variable is next year aggregate number of negative E&S issues (*E&S*, *Env*, and *Soc*). *Spillover* is the weighted average of E&S incidents of other firms based on the geographic proximity of directors. $Spillover^{HQ}$ is the weighted average of E&S incidents of other firms headquartered in the same county. *High_Transient*, *High_QuasiIndexer*, and *High_Dedicated* are indicator variables for above sample median of transient, quasi-indexer, and dedicated institutional ownership, respectively. In the regressions, the dependent variable and the spillover measures are all standardized (mean = 0, s.d. = 1). Control variables are defined in Appendix A. Standard errors clustered at the firm-level are reported in parentheses. Significance levels at 10%, 5%, and 1% are indicated by *, **, and ***, respectively.

	(1)	(2)	(3)
Dependent variable:	*E&S*	*Env*	*Soc*
Spillover	0.130***	0.065***	0.147***
	(0.042)	(0.021)	(0.053)
Spillover × *High_Transient*	-0.076***	-0.037***	-0.091***
	(0.021)	(0.013)	(0.027)
Spillover × *High_QuasiIndexer*	-0.049**	-0.021	-0.059**
	(0.023)	(0.015)	(0.029)
Spillover × *High_Dedicated*	0.044***	0.025**	0.050***
	(0.014)	(0.010)	(0.018)
High_Transient	-0.041***	-0.017**	-0.051***
	(0.010)	(0.007)	(0.013)
High_QuasiIndexer	-0.051*	-0.028**	-0.059
	(0.030)	(0.014)	(0.038)
High_Dedicated	0.016	0.007	0.019
	(0.012)	(0.008)	(0.015)
$Spillover^{HQ}$	-0.043	-0.043**	-0.047
	(0.035)	(0.020)	(0.047)
Nonlocal industry peers average	0.072	0.099	-0.045
	(0.218)	(0.303)	(0.167)
Suppliers and customers average	0.002	-0.001	0.001
	(0.006)	(0.006)	(0.006)
Other control variables	Yes	Yes	Yes
Firm fixed-effects	Yes	Yes	Yes
State-by-year fixed-effects	Yes	Yes	Yes
Industry-by-year fixed-effects	Yes	Yes	Yes
Observations	30280	30280	30280
R-squared	0.805	0.860	0.750

Table 7: Moderating Effect by Political Leaning

The dependent variable is next year aggregate number of negative E&S issues (*E&S*, *Env*, and *Soc*). *Spillover* is the weighted average of E&S incidents of other firms based on the geographic proximity of directors. $Spillover^{HQ}$ is the weighted average of E&S incidents of other firms headquartered in the same county. *Blue* takes the value of 1 if the firm's headquarters is located in a "Blue" county (voted Democratic Party in the most recent Presidential election), and zero otherwise. In the regressions, the dependent variable and the spillover measures are all standardized (mean = 0, s.d. = 1). Control variables are defined in Appendix A. Standard errors clustered at the firm-level are reported in parentheses. Significance levels at 10%, 5%, and 1% are indicated by *, **, and ***, respectively.

	(1)	(2)	(3)
Dependent variable:	*E&S*	*Env*	*Soc*
Spillover	0.031**	0.026	0.026*
	(0.014)	(0.018)	(0.014)
Spillover × *Blue*	0.076**	0.029	0.091**
	(0.030)	(0.021)	(0.038)
Blue	0.027	0.022	0.027
	(0.021)	(0.022)	(0.021)
$Spillover^{HQ}$	-0.054	-0.048**	-0.059
	(0.039)	(0.022)	(0.052)
Nonlocal industry peers average	0.079	0.107	-0.055
	(0.232)	(0.312)	(0.177)
Suppliers and customers average	0.001	-0.001	-0.001
	(0.006)	(0.006)	(0.006)
Other control variables	Yes	Yes	Yes
Firm fixed-effects	Yes	Yes	Yes
State-by-year fixed-effects	Yes	Yes	Yes
Industry-by-year fixed-effects	Yes	Yes	Yes
Observations	30280	30280	30280
R-squared	0.804	0.859	0.748