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Word Power: The Impact of Negative Media Coverage on Disciplining Corporate Pollution

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Abstract Sequences of individual words make up media reports. And sequences of media reports constitute the power of the news media to influence corporate practices. In this paper, we focus on the micro-foundations of news reports to elaborate how an atmosphere of negative news reports following an initial exposure of corporate pollution activity can help stop such activity through their impact on corporate managers. We extend our understanding of the corporate governance effect of news media by considering two new aspects of reports—one, the proportion of words in negative reports relative to the total number of words in all reports; and two, the geographical origin of news media. We suggest that the more negative the media coverage, and the more local this coverage, the greater the impact on corporations. Our study of news media reports from more than 600 newspaper sources on disciplining pollution activities of listed Chinese firms from 2004 to 2012 provides strong support for our hypotheses. These findings have valuable implications for the handling of pollution issues in transitional economies via the power of news words.

Keywords Word count · Negative reports · Geographic location · Corporate pollution

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Introduction

The news media has an important effect on corporate business practices due to their dominant position as information intermediaries in our society (Bednar 2012; Core et al. 2008) for stakeholders, who access information about firms primarily via news media (Bednar et al. 2013; Dyck et al. 2008; Pollock and Rindova 2003). Previous studies have supported the notion that media reports (e.g., coverage and tenor) influence various aspects of corporate business, including stock performance (Bhattacharya et al. 2009), CEO compensation and dismissal (Core et al. 2008), corporate acquisitions (Liu and McConnell 2013), financial fraud (Miller 2006), and strategic change (Bednar et al. 2013). Recently, several studies have focused on the disciplining power of the media on corporate social practices, such as corporate philanthropy (Chiu and Sharfman 2011; Gan 2006). Based on a similar methodology, recently several studies have extended the role of media coverage to study its influence on corporate pollution practices (Kassinis and Vafeas 2006; Tang and Tang 2013).

Our paper improves on these studies in various ways. From the agenda-setting literature, we adopt the notion (McCombs and Shaw 1972) that the priming effect of news media provides an important theoretical framework for the analysis of news impact on public opinion (McCombs 2005). Agenda setting refers to the idea that there is a strong correlation between the emphasis that mass media places on certain issues (e.g., based on relative placement or amount of coverage) and the importance attributed to these issues by mass audiences (Scheufele and Tewksbury 2007; Weaver 2007), whereas priming emphasizes the mental accessibility of news reports to readers/viewers of those news reports. Accordingly, when studying the impact of news reports, it is important to incorporate various

priming aspects of the news reports. In this paper, we provide evidence on the influence of the news media on corporate pollution activity, as well as on the importance of priming variables in this context.

Our paper also improves on previous work in several ways in terms of our measures of media coverage. First, previous studies have measured media coverage primarily by counting the number of media reports in a given period (e.g., Bednar 2012; Pollock and Rindova 2003). However, the public is much more likely to respond to the change in media coverage following a pollution event, rather than the absolute level of media coverage. For example, a neglected firm, which becomes news visible after exposure of its pollution activity, would attract much more public attention.

Second, news media use specific words to indicate their opinion about a focal corporation (Jegadeesh and Di Wu 2013; Tetlock et al. 2008). Not all news reports have the same impact on readers; hence, assuming every negative report is equal to every other negative report that is misguided. For instance, audiences perceive a report that narrates a story in a dramatic fashion with a lot of details to be more useful and more reliable compared to a brief report (e.g., Martens et al. 2007). In this paper, therefore, we take into account the length of negative news reports.

Third, stakeholders have preferences over information sources (e.g., Barnett 2014). Previous studies have failed to take the geographic location of news media into consideration. This generates at least two biases: on the one hand, studies based on nation-wide newspapers (e.g., China Securities Journal) ignore the impact of local news media, such as the NanFang Daily in southern China, on regional stakeholders. Many studies support that local stakeholders have easy access to local corporate information and take advantage of business relationships with local firms (Gurun and Butler 2012; Huse and Rindova 2001). Furthermore, local newspapers actually have a strong influence on the local public. For example, Engelberg and Parsons (2011) find that local newspaper reports have a stronger influence on the trading of local stocks. In this paper, we distinguish news reports by their source, i.e., whether a report is local or national. There are more than 600 newspapers in China, most of which are regional and dominate the local public's information sources. If readers are more influenced by local news as suggested by Engelberg and Parsons (2011) in their study of stock trading, ignoring this aspect of information could underestimate the impact of news media on corporations.

Finally, previous studies have studied the impact of news reports on positive aspects of corporate social responsibility, such as corporate philanthropy (Chiu and Sharfman 2011; Gan 2006). The impact of media coverage on corporate social practices functions through two conduits: on the one hand, the news media is an information broker that disseminates corporate information to a wide public and mitigates the information asymmetry between firms and stakeholders (Bednar 2012; Dyck et al. 2008; Dyck and Zingales 2002; Frankel and Li 2004; Miller 2006; Saxton and Anker 2013; Wildman 2008). On the other hand, the media plays a social constructivist role that determines how the public evaluates a focal firm and what it expects in terms of desirable corporate practices. Consequently, stakeholders' scrutiny and expectations put pressure on corporate social practices. However, there has been insufficient examination of the effect of news media attention on corporate pollution, which can be considered a negative aspect of corporate social responsibility.

Our study is similar to that of Tang and Tang (2013, henceforth TT) in that both of us examine the news media's governance effect on corporate pollution practices in China. However, there are several significant differences between our study and that of TT. TT measure media coverage by looking at the absolute number of media reports during the exposure of corporate pollution events; they also ignore differences in the quality of news reports, as well as the geographical origins of news reports. As mentioned above, we look at the change in media coverage following corporate pollution events and we control for differences in the quality of news reports and their geographical provenance. TT also restrict attention to corporate responses to media coverage over a single year following the initial corporate pollution report. In contrast, we look at subsequent corporate pollution events to examine whether the news media impacts corporate pollution practice over a much longer period.

We contribute to the literature on the governance role of news media in various ways. We emphasize the differences among the reports; previous studies assume that they are identical. We measure each report's word count, and we focus on the dynamic change of news reports before and after an event rather than on the static coverage of an event to capture the media-constructed atmosphere. We also emphasize the importance of the role of the local news media, while previous studies largely ignore it.

The article proceeds as follows: we first describe the research setting and elaborate our arguments regarding the relationship between news media coverage and subsequent corporate pollution. We then describe our methodology and empirical results followed up with a discussion of our findings.

Research Framework and Hypothesis Development

Research Framework and News Censorship in China

News media are generally profit driven and they naturally prefer to report news that would attract public attention

(Dyck et al. 2008). A negative report exposing a firm engaging in pollution activity is newsworthy because readers are interested in knowing more about an activity that affects their daily lives in very significant ways. Inevitably, the way that corporate activity is presented to the public affects the public's perception of that activity. And, as we will explain later, public attitudes to revelation of corporate pollution are likely to affect corporate propensity to continue polluting.

While the above description might apply to the operation of media coverage in any country, there are some special aspects to media coverage in China, because of the government's control of any activity that affects public perceptions and social stability. In other words, the Chinese government is intensely interested in the agenda-setting activity of Chinese media. Normally, the Chinese government through its propaganda departments and through the State Council Information Offices tries to dampen strong media criticism or coverage about topics that it considers taboo, such as a multi-party system (Cairns 2013; Tang and Tang 2013). These government arms issue directives listing acceptable topics of media coverage and draw a metaphorical red line that the media is not supposed to cross. In general, the media follows government directives, since violations of government directives could threaten their existence. However, after the news media reforms of 2004, there are now countervailing forces in that media companies do not receive government subsidies and have to survive on their own; naturally this means that they are always on the lookout for news items that are likely to draw reader interest. On the issue of pollution, moreover, the interests of profit-seeking media and those of the government converge (Ven 2014; Wong 2013). Since the 18th party congress in late 2012, the government has been serious about curbing pollution. Thus, media coverage of corporate pollution not only is consistent with Chinese government concerns, but also caters to audience demands for knowledge about corporate pollution.

In this paper, we review the governance role of the Chinese news media in disciplining corporate pollution. We hypothesize that negative media coverage of corporate pollution incidents is likely to lead to a reduction of such pollution, and, furthermore, that local media coverage is more likely to be successful in influencing firms to cease to pollute. Figure 1 explains our research framework visually. In the following sections, we will provide theoretical support for our hypotheses.

The Impact of Negative Media Atmosphere on Subsequent Corporate Pollution

After an initial exposure of corporate pollution, the public is more likely to pay attention to events pertaining to the focal firm. Generally, individuals tend to pay more attention to negative information perceiving it to be more informative, relying on it to a greater extent to form judgments, and responding to it more strongly than to positive information (Dennis and Merrill 1991; Dean 2004; Mizerski 1982; Pfarrer et al. 2010; Rozin and Royzman 2001). News media, therefore, are more likely to pursue negative news about the firms and to report news with a negative tenor. Figure 2 shows the timeline of the generation of a negative news atmosphere and subsequent corporate pollution.

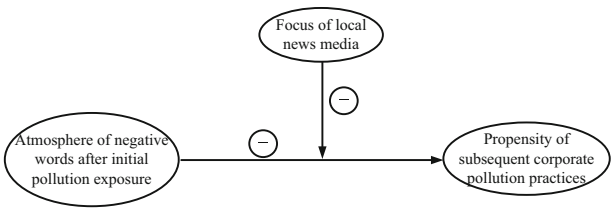

Fig. 1 Research framework

The priming aspect of agenda-setting theory suggests that the news media determines what the public should think about the firm (McCombs and Shaw 1972; McCombs 2005). In such a situation, the public would be more receptive to negative reportage regarding the focal firm and will be more likely to evaluate the firm negatively based on that reportage.

CEOs of the focal firm, in turn, are likely to respond to such negative reporting for two reasons. One, the negative atmosphere created by the media toward a firm can damage managerial reputations. Public disapproval of the firm is likely to harm managerial careers; for example, Bednar (2012) finds that negative news reports are associated with a reduction in CEO compensation and CEO dismissal. Two, media coverage is likely to draw unwanted government attention and supervision (Tang and Tang 2013).

We thus put forward the following hypothesis:

Hypothesis 1 Following an initial exposure of corporate pollution, the more negative the atmosphere of the media coverage, the greater the likelihood that the firm will stop polluting.

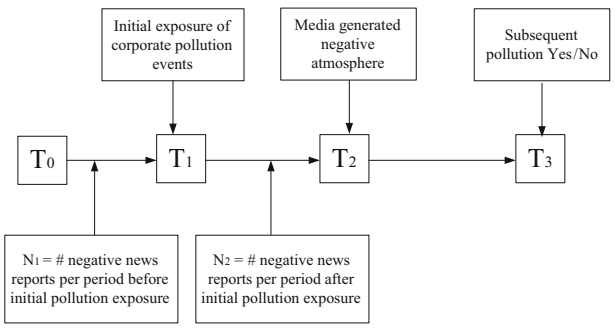

Fig. 2 Timeline of events

The Role of the Local News Media

Researchers have suggested that, in certain contexts, local news coverage has more impact than national coverage. For example, local news media reports about local corporations strongly influence stock trading (Engelberg and Parsons 2011). Hence it is reasonable to conjecture that local coverage of corporate pollution will have a disproportionate impact on continued corporate pollution, as well.

There are several reasons why this should be so. First, local news media have better access to corporate information. Journalists close to corporate headquarters would have closer relationships with corporate managers, local government officials, and NGOs, which they could exploit to obtain better information about corporate pollution (Miller and Shanthikumar 2010). Journalists, with access to soft information about a local firm, can construct more attractive stories (Gurun and Butler 2012; Kothari et al. 2009; Vasterman 2005). Second, local newspapers generate profits mainly from local audiences, which are more interested in local news; hence competition among local newspapers for readership will ensure maximal coverage of local events. For example, Gurun and Butler (2012) point out that local news media are more likely to acquire information from local stakeholders, and thus local news media have a greater ability to report on local firms in more detail due to the proximity of news sources and other non-public information (Kothari et al. 2009) compared with nation-wide newspapers.

Previous studies in finance area show a profound geographic segmentation of the domestic capital market. Geographic location significantly influences corporate capital structure (Bancel and Mittoo 2004), investors' choice of equity investment (Gurun and Butler 2012; Hong et al. 2008), and analysts' (Malloy 2005) and underwriters' (Corwin and Schultz 2005) ability to discover corporate value. All of these studies find that local stakeholders, including investors, analysts, bank, and underwriters, possess information advantages over other more distant stakeholders. Consequently, local media play an important role in corporate decisions through their impact as information providers on local stakeholders. This is even more likely to be true in our case, since local stakeholders (e.g., community, investors, local bank, and employee associates) generally possess scarce resources essential for corporate survival and are more likely to be affected by local corporate pollution than distant stakeholders.

Finally, CEOs are likely to take their local reputations seriously. Previous studies show that managers in family firms would be willing to give up profits to protect their local reputation (e.g., Berrone et al. 2010; Gomez-Mejia et al. 2007). Moreover, CEOs look to improve their political status in their local regions; however, local news media reports on the corporate pollution practices seriously damage CEOs' local reputations (Dyck et al. 2008). Based on the above arguments, we formulate the following hypothesis:

Hypothesis 2 Given the degree of negative news atmosphere after exposure of corporate pollution events, the stronger the intensity of local news focuses on a focal firm, the greater the likelihood of cessation of further pollution.

Research Design and Methodology

Sample and Data Collection

We study Chinese listed firms in industries categorized as polluting by the China Securities Regulatory Commission (classification codes B, C0, C1, C2, C3, C4, C6, C8, and D). The total initial sample consisted of 1040 listed companies. Following the Environmental Protection Law of the People's Republic of China,[1] we define the scope of environmental pollution behaviors to include the following: excessive emission over the legal level, improper dealing with wastes, administrative punitive action for environmental pollution, official disclosure of environmental pollution, and other corporate practices in violation of regulations. Because pollution is a sensitive issue at the local government level, we are only able to identify the quarter in which the violation took place—a more precise identification of the timing is, unfortunately, not possible. However, for several reasons, we believe that this level of specificity is sufficient for our purposes. First, the media can only be expected to create negative coverage of a firm over a longer period of time. Second, a media investigation of corporate pollution could take a long time; and finally firms may react only after an extended period of media coverage, if only because the technical steps required to stop pollution cannot be taken overnight.

We identify the initial pollution event as follows. We first search China National Knowledge Infrastructure (CNKI), a prominent Chinese newspaper database, from 2004 to 2012, using specific keywords[2] combined with the firm name to find reports of corporate pollution. We also

[1] The source of information is http://www.envir.gov.cn/law/envir.htm.

[2] Numerous keywords are used in Chinese to portray the characteristics of corporate pollution events including: contaminate, damage, pollution discharge, underlying discharge, waste water, out of limitation, leak, explode, death, accident, safe, violation, smoke dust, oil leak, dam break, loss, gas, carcinogenic, poison, blacklist, deforestation, investigation, waste gas, waste residue, dirty, reorganize, revamp (in Chinese, these terms are 污染、破坏、排污、偷排、废水、超标、泄露、爆炸、死亡、事故、安全、违规、烟尘、溢油、漏油、溃坝、损失、瓦斯、致癌、毒、黑名单、毁林、违法、调查、废气、废渣、黑榜、恶、脏、整顿、整改).

look up the database provided by the Institution of Public and Environmental Affairs (IPE),[3] which collects many details of corporate pollution events. Finally, we combine data from the above two sources of information. We were able to collect information about 932 corporate pollution incidents, including the date of occurrence. We do not classify incidents according to the severity of the pollution because the media does not always provide sufficient detail (Mishina et al. 2010). Moreover, if all corporate pollution events are subject to underreporting and provide only approximations of the actual losses or casualties, it becomes particularly difficult to provide fine-grained distinctions about the number or severity of particular incidents. Additionally, the potential underreporting of corporate pollution events implies that each exposed event is as important as the others.

Of the total sample of firms, some 336 firms engaged in multiple pollution activities during the same quarter; after removing these repeated observations, we obtained 596 unique firms with pollution event reports in the sample period.

We deleted firms for which the initial pollution incident occurred in 2012, so as to allow at least four quarters for the firm to respond to media coverage before the end of our sample period; there were 60 such events. Observations with missing data on institutional investor shareholding ratio, total assets, and the growth rate of gross operating income were also deleted, which includes 116 records.

We also deleted firms which rank in the top 10 % of listed firms in polluting industries, in terms of total assets. This is because such large firms with monopoly power are unlikely to care much about negative media exposure (e.g., China Petroleum). Davis (2006) and Gurun and Butler (2012) also support the notion that news media influence small firms' practices to a greater extent. Furthermore, there is so much media attention paid to these large firms that it would be difficult to measure changes in media negativity following particular pollution incidents (e.g., there were 20,000 news reports on China Petroleum during our study period). There were 85 observations which fell within this category. As a robustness test, we include these firms in an extended sample, for which results are shown in Table 7. We ended up finally with 335 observations.

Measures

Dependent Variables

To measure the focus firm's reaction to media coverage, we define a dummy variable called subseq, which takes the value 1 if there is any kind of pollution from that firm in *any subsequent* quarter[4] following the quarter t in which the initial exposure occurs and 0 otherwise.

The definition of subseq is potentially problematic because not all firms have the same length of time to react to the initial media exposure. For example, firms for which the initial exposure event took place in 2004 have 8 years to stop (or continue pollution), whereas firms that originally polluted in 2011 only have 1 year (until 2012) to desist from polluting (or continue polluting). Consequently, the effect of the negative media atmosphere after the initial pollution exposure could vary among different perpetrators. To deal with this issue, we also consider a short-term effect by introducing the dependent variable of subseq1, which takes the value 1 if there is pollution from the focal firm in the *four* quarters following the quarter in which the initial pollution report occurs, and 0 otherwise. These two measures would help us to control the impact of observation period length on our hypothesized relationships.

Independent Variables

The variable atmosneg is used to measure the degree of media negativity in reaction to corporate pollution.

$$\text{Atmosneg}_t = \frac{(\text{Negative words}_t + \text{Negative words}_{t+1}) - (\text{Negative words}_{t-2} + \text{Negative words}_{t-1})}{(\text{Words}_{t-2} + \text{Words}_{t-1} + 1)}, \quad (1)$$

where t represents the quarter of initial exposure of corporate pollution events, $t-2$, $t-1$, and $t+1$ represent two quarters prior to, one quarter prior to, and one quarter after the initial corporate pollution exposure. negative words_{t-1} (words_{t-1}) represents the total number of words in negative articles (total words in all articles) in the one quarter before the initial exposure of corporate pollution. We add 1 to the denominator for all firms because for several firms there is no news coverage before the initial exposure of corporate pollution (the way in which we identify a negative article

[3] The Institution of Public and Environmental Affairs (IPE) is a registered non-profit organization based in Beijing. Since its establishment in May 2006, the IPE has developed two pollution databases (water and air) to monitor corporate environmental performance and to facilitate public participation in environmental governance.

[4] Until the end of our time period.

will be explained below). This measure is an improvement over existing measures of media coverage in several ways. First, we look at the volume of current news coverage in comparison to the previous period. Second, instead of simply counting the number of negative news reports, we look at the length of negative articles (measured by the number of words in the article) compared to the total length of all articles (i.e., total number of words in all articles). The longer the article is, the more details that it provides and the more persuasive audiences perceive it to be. For example, Bushee et al. (2010) find that longer and in-depth media coverage reduces the degree of information asymmetry, and is associated with more stock trades. This enables us to better measure the degree of negativity of the atmosphere created by the media in its reportage. Allowing for the degree of negativity of the media atmosphere permits us to capture the extent of priming induced by the article in its readers; a more negative media atmosphere is likely to trigger recall in readers when making judgments about corporate value and executives and as such is more likely to influence management to curtail pollution.

We use the news service provider, WISERS, arguably the most complete news source (wisesearch.wisers.net), to search for meaningful news reports regarding each firm. To determine whether a news report is to be considered meaningful or not, we introduce the following standards (e.g., Qi et al. 2013): the name of firm must appear on the title or in the first paragraph of the news report, the length of the report must be larger than 50 words, and no more than four corporations must be mentioned by the report. After this initial screen, we get a total of 19,362 distinct news reports.

We then go on to evaluate the tenor of each report. Previous studies on report tenor rely mainly on the computer-based support of text content analysis (e.g., LIWC). A technique widely used by English-language studies of news reports is to identify the attitude of each report (positive or negative) by counting the frequency of negative and positive words using a large keywords database (e.g., Tetlock 2007). However, such an automated technique is less applicable to Chinese-language news reports, since Chinese words often have different meanings depending upon the context. As a result, a better method is for a researcher to read the reports directly to measure the negativity of the article. In order to ensure the reliability of this technique, 300 reports were chosen randomly and were read and independently evaluated by two different authors of this article. Similar to previous studies such as Pollock et al. (2008), we calculate the inter-coder reliability utilizing Cohen's κ (1968). We found a Cohen's κ value of 0.89, indicating high inter-coder agreement. We finish with a final tally of 3409 negative reports.

Moderating Variables

We introduce the variable localfocus to measure the intensity of local news media reporting on the firm. Localfocus is computed as follows:

$$\text{Localfocus}_t = \frac{\text{Number of local newspapers reporting on a focal firm}_t + \text{Number of local newspapers reporting on a focal firm}_{t+1}}{\text{Number of newspapers reporting on a focal firm}_t + \text{Number of newspapers reporting on a focal firm}_{t+1}}. \quad (2)$$

WISERS includes more than 600 newspapers as news sources. We first search the newspaper's website to decide the issuance zone of each newspaper. For example, a local newspaper's website might clearly define its mission as providing information for a specific region. We categorized 141 newspapers as providing nation-wide coverage (e.g., People's Daily) and 497 as local newspapers. For example, Guangdong province has the largest number of local newspapers around China. For a given firm, we match the issuance region of local newspapers with the registered location of each firm, and then determine the set of local news media for each firm. Next, based on the records of news reports on the firm in the quarter of initial exposure, we count the number of local newspapers which report on the focal firm. We also define an additional variable localfocus1, which looks at the proportion of local media in the period prior to the initial exposure of corporate pollution.

Controls

We include some important control variables. First, following Bednar et al. (2013), we control for firm size, since it is likely to impact the incidence of environmental pollution events (Mishina et al. 2010). Firm size is measured by the log of total assets of the focal firm. Menon and Pfeffer (2003) report that independent directors pay much more attention to information from external sources (newspapers, magazine, and so on). We also know from existing research that negative news damages the reputation of independent directors (Arthaud-Day et al. 2006;

Cowen and Marcel 2011; Srinivasan 2005), who would influence subsequent corporate practices. Therefore, we control for the percentage of independent directors on the corporate board (percentind), which we measure by the number of independent directors divided by the total number of directors. Following McGuire et al. (1988), we use the growth rate of total operating income (opincgr) to control for the influence of the firm's financial condition. Generally, whether a firm chooses to pollute the environment is related to its financial condition; the better the firm's financial condition, the more likely it is willing to accede to stakeholder desires. Opincgr is calculated using the following formula:

$$\text{Opincgr} = \frac{\text{Total operating income in current year}}{\text{Total operating income in previous year}} - 1. \tag{3}$$

A firm subject to a steady stream of negative coverage and then receiving a spike in negative coverage is likely to react differently than a firm subject to no coverage at all and then to a stream of negative reporting. To control for this effect, we measure the number of negative news reports on a focal firm (N_{coverage}) a quarter prior to the pollution events. N_{coverage} is transformed into its natural logarithm. This control would also account for the negative reputation of each firm; bad firms may attract more bad news. Additionally, although we focus on the power of local media, large or global corporations are more likely to be directly affected by national media coverage (Gurun and Butler 2012). To account for this effect, we measure the total number of news coverage (mediacoverage) on each firm a quarter prior to the initial pollution incident. Mediacoverage is also transformed into natural logarithm to reduce the potential effects of extreme values. Moreover, this variable accounts for the corporate visibility effect: (Bansal 2005; Brammer and Pavelin 2006) generally a corporation with large news coverage would be more familiar to customers. Finally, some firms are directly owned by the Chinese government. This relationship is likely to influence how a firm would react to news reports. We introduce the corporate ownership (ownership) to control for the state-firm connection: if the corporation is majority state owned, we code it as 1; otherwise we code it as 0.

Following Walls et al. (2012), we introduce the percentage of institutional shareholding (percentinst), which might have a positive effect on the cessation of corporate pollution practices. Following Liu and Lu (2007), we introduce a control variable which checks for whether the firm issues either B or H shares (BorH), which foreign shareholders outside China hold. If a focal firm has issued either B or H shares, it would gain much attention from outside investors and news media, which is likely to have an impact on how the firm would view media attention (see Liu and Lu 2007). If the firm has issued either B shares or H shares, we code the variable BorH as 1; else, it equals 0. Following Desai (2011), we also control for firm age. Finally, we include several year dummies and industrial dummies to control for year and industry effects. The definitions of all variables are summarized in Table 1.

Analysis

Whether societal agencies (e.g., news media and government agencies) choose to expose a firm's pollution practices is not random but rather influenced by many factors. For example, Core et al. (2008) find that the news media have a greater tendency to report negative news about large firms. To deal with the potential sample selection bias, we use a Heckman two-stage regression model.

Based on our sample of firms with pollution exposures, we match the focal firm with another exposure-free corporation (without any exposure of pollution events from 2004 to 2012) in the same industry, and most similar in terms of total assets in the given fiscal year. The originally sample of pollution events (932 cases) pertains to 490 unique listed firms. In the first-stage probit model, we use a matching sample of another 490 firms to explore the factors determining the initial exposure of corporate pollution events.

Table 2 presents the results of the first-stage Heckman selection model, a probit regression of corporate pollution exposure against factors thought to influence whether societal agencies expose corporate pollution of a given firm. The dependent variable is a dummy variable indicating whether a firm's pollution practices are exposed or not. We use the following independent variables: the three highest managerial salaries, shareholding concentration, firm size, debt–asset ratio, and industry and year dummies. Following this regression, we calculate of the inverse Mills ratio, which we include in the second-stage model as selection correction parameter (e.g., Wang et al. 2008).

We use the following equation to test our hypotheses in the second-stage regression:

$$\begin{aligned}\text{Subseq}_t = {} & a_0 + b_1 * \text{atmosneg}_t + b_2 * \text{localfocus}_t + b_3 \\ & * \text{localfocus}_t * \text{atmosneg}_t + b_4 * X_t + \xi.\end{aligned} \tag{4}$$

In Eq. 4, X is a set of control variables that are supposed to have an influence on corporate pollution practices. The subscript t represents the quarter of initial exposure of corporate pollution, and ε is an error term. We use the codes of 'robust' and 'cluster' of firm identification number provided by STATA 12.0 to control for heteroscedasticity.

Table 1 Definition of variables

Variables	Description	Sources
Subseq	It equals 1 if a focal firm conducts pollution subsequently after exposure of corporate pollution practices in a quarter t; otherwise, it equals 0	D
Atmosneg	$\text{Atmosneg}_t = [(\text{negative words}_t + \text{negative words}_{t+1}) - (\text{negative words}_{t-2} + \text{negative words}_{t-1})]/(\text{words}_{t-2} + \text{words}_{t-1} + 1)$	D
Percentinst	Log-transformed of (100 * percentage of shares holding by institutional investors + 1)	C
Localfocus	Localfocus_t = (number of local newspapers reporting on focal firm$_t$ + number of local newspapers reporting on a focal firm$_{t+1}$)/(number of newspapers reporting on a focal firm$_t$ + number of newspapers reporting on a focal firm$_{t+1}$)	D
Firm size	Log-transformed of total assets	C
Mediacoverage	Log-transformed of (the total number of news reports on the focal firm a quarter prior to the pollution event + 1)	D
N_{coverage}	Log-transformed of (the number of negative news reports on the focal firm a quarter prior to the pollution event + 1)	D
Ownership	If the firm is majority state-owned, we code as 1, otherwise, we code it as 0	B
Opincgr	Log-transformed of (100 * total operating income in current year/total operating income in previous year)	C
Inverse Mills ratios	We introduce the Heckman two-stage models to control for the sample selection bias and calculate it based on the results of first-stage probit regression	A–C
Percentind	The number of independent directors divided by the total number of directors	A, B
Firm age (until 2013)	The gaps from years of IPO to year of 2013	B
BorH	It equals 1 if a focal firm issues either B or H shares; otherwise, it equals 0	B

This table reports the variables used in the regression analyses and their descriptions

Data source A represents annual reports, B represents GTA data stream (http://www.gtarsc.com/), C represents Genius Finance data stream (http://terminal.chinaef.com/), D represents the China National Knowledge Infrastructure newspaper database (http://epub.cnki.net/), and WiseSearch engine (http://cn.wisesearch.wisers.net)

Table 2 First-stage probit model

Independent variables	Dependent variable Initial exposure of corporate pollution events
Top three highest salaries of managers	0.12** (0.04)
Concentration of shareholding[a]	−0.01 (0.07)
Firm size	−0.02 (0.05)
Asset–debt ratio	0.58* (0.29)
Industry	Control
Year	Control
Constant	−0.51 (1.30)
Pseudo-R^2	0.04
N	980

Standard errors were in parentheses

*** Statistic significant at the 0.001 level, two-tailed test; ** statistic significant at the 0.01 level, two-tailed test; * statistic significant at the 0.05 level, two-tailed test; $^+$ statistic significant at the 0.1 level, two-tailed test

[a] Logarithms

Results

Table 3 presents descriptive statistics and pairwise correlations for the variables in this study. Simply looking at the mean values of some of our variables is very instructive. The mean value of subseq is 59 %, which shows that more than a half of the corporations continue to pollute after the initial pollution exposure. Atmosneg averages 21 %, indicating an increased negativity of media coverage after initial exposure of a pollution incident. The local news media account only for a small proportion of the total news media reporting on a focal firm, as indicated by a mean value of 15 % for localfocus. These numbers can be taken to indicate that the media have done their job, considering the increase in negative coverage following the initial pollution incident. Taken together with the approximately 40 % rate success in getting firms to stop polluting, one may tentatively conclude that this was due to the media coverage. And this does seem to be, indeed, the case, going by the significantly negative correlation of −0.13 between subseq and atmosneg, which supports hypothesis 1. We will follow this up with a more rigorous analysis, going forward.

Meanwhile, we see that some variables are significantly correlated, such as firm size, percentinst (percentage of institutional shareholding), inverse Mills ratios, percentind, and BorH. Hence, we further examine whether there is a multicollinearity problem by calculating variance inflation factors (VIFs). An inspection of the correlations does not reveal any serious multicollinearity, showing a maximum VIF of 1.65 (for mediacoverage) and a mean VIF of 1.24—substantially less than the cutoff of 10 for regression models (Ryan 1997). Therefore, we conclude that multicollinearity is not an important issue in our study.

Table 4 presents our main results. We present results for three models: model 1 is a basic model that does not include either atmosneg or the interaction of atmosneg with localfocus. Model 2 includes atmosneg as an explanatory

Table 3 Descriptive statistics and correlations

Variables	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13
(1) Subseq	0.59	0.49	1.00												
(2) Atmosneg	0.21	0.98	−0.13	1.00											
(3) Localfocus	0.15	0.15	0.09	−0.02	1.00										
(4) Mediacoverage[a]	7.60	2.58	0.03	−0.44	0.01	1.00									
(5) $N^{a}_{coverage}$	3.23	3.62	−0.02	−0.25	0.01	0.47	1.00								
(6) Ownership	0.74	0.44	0.18	−0.02	0.14	0.13	0.07	1.00							
(7) Firm size[a]	22.17	1.22	0.07	−0.13	0.08	0.30	0.15	0.22	1.00						
(8) Percentinst[a]	3.33	1.02	−0.07	−0.06	0.08	0.07	0.04	0.20	0.15	1.00					
(9) Opincgr[a]	4.80	0.30	−0.06	−0.01	−0.02	−0.08	−0.09	−0.08	0.02	0.05	1.00				
(10) Percentind	0.35	0.05	−0.09	0.04	0.05	0.02	0.07	−0.04	0.04	0.09	0.15	1.00			
(11) BorH	0.12	0.32	0.12	−0.13	0.28	0.14	0.21	0.18	0.35	0.04	−0.11	0.07	1.00		
(12) Firm age (until 2013)	14.04	4.25	0.21	−0.07	0.05	0.00	0.08	0.31	0.18	0.17	−0.04	0.05	0.21	1.00	
(13) Inverse Mills ratios	0.77	0.19	−0.25	0.11	−0.10	−0.13	−0.13	−0.10	−0.22	−0.00	−0.03	−0.00	−0.26	−0.17	1.00

$N = 335$; correlations $\geq |0.06|$ are significant at $p < 0.05$ level

[a] Logarithms

variable, the coefficient ($\beta = -0.36$, $p < 0.05$) for which is significantly negative supporting hypothesis 1.

Hypothesis 2 predicts that localfocus would have a negative moderating effect on the relationship between atmosneg and subseq. As model 3 shows, the interaction term between localfocus and atmosneg is negative and significant ($\beta = -2.37$, $p < 0.05$), indicating not only that the news media have a role in getting firms to stop polluting but also that the local media are even more important in this than national media, which supports hypothesis 2.

The change in log-likelihood (a χ^2 test of model significance, see Guadagni and Little 1983) confirms the incremental value of both our primary explanatory variables and supports both of our hypotheses.

Robustness Tests

Additional Measures of News Atmosphere

To construct a reasonable measure of news coverage regarding corporate pollution, we have used the following procedure. We first collect the keywords regarding to environmental pollution and then use these keywords to program a STATA routine screening for news related to corporate pollution. Then, we construct a measure of news atmosphere regarding corporate pollution issues using the following formula:

$$\text{Atmosneg}_t = \frac{(\text{Words of pollution articles}_t + \text{Words of pollution articles}_{t+1}) - (\text{Words of pollution articles}_{t-2} + \text{Words of pollution articles}_{t-1})}{(\text{Words of pollution articles}_{t-2} + \text{Words of pollution articles}_{t-1} + 1)}. \quad (4)$$

Finally, we substitute this new variable for the independent variable of atmosneg and duplicate the models shown in model 3 of Table 4. The results shown in model 4 of Table 4 are still consistent with our main findings that even after taking into account the news atmosphere regarding overall corporate pollution, negativity of news reports ($\beta = -0.15$, $p < 0.01$) would help to discipline subsequently corporate pollution.

Second, we consider the impact of where a news report appears in a newspaper on audience attention. As a matter of fact, few newspapers report corporate events negatively on the front-page; hence we define the variable cover story as news appearing on the first two pages of a newspaper. Then, we introduce the following formula to measure the news atmosphere:

$$\text{Atmosneg}_t = \frac{\begin{array}{c}(\text{Words of negative articles on first two pages}_t + \text{Words of negative articles on first two pages}_{t+1}) \\ -(\text{Words of negative articles on first two pages}_{t-2} + \text{Words of negative articles on first two pages}_{t-1})\end{array}}{(\text{Words of articles on first two pages}_{t-2} + \text{Words of articles on first two pages}_{t-1} + 1)}. \quad (5)$$

Similarly, we substitute this new variable for our previous independent variable atmosneg and the results shown in model 5 of Table 4 are still consistent with our main findings that even considering the cover story of news reports negatively on a focal firm, negativity of news reports ($\beta = -0.25$, $p < 0.05$) still help to discipline subsequently corporate pollution.

Additionally, we further consider to what extent cover story helps disciplining corporate pollution and constructs a dummy variable of cover story, which codes as 1 if there is reportage of a focal firm on the first two pages of a newspaper; else it codes as 0. In model 6 of Table 4, we report the results introducing the interaction term between cover story and *news atmosphere* ($\beta = -1.17$, $p < 0.05$), which confirms that cover story would in general strengthen the effect of news negativity on disciplining corporate pollution.

Alternative Measure of the Dependent Variable (Subseq1)

As explained earlier, subseq1 measures the reaction of the focal firm within four quarters of the initial pollution event. We code subseq1 as 1 if the corporation engages in pollution practices within 1 year (or four quarters) after initial pollution exposure, else it equals 0.

Table 5 presents results for subseq1 paralleling those for subseq in Table 4. Model 2 shows that the independent variable atmosneg is negatively associated with subseq1 ($\beta = -0.52$, $p < 0.05$), which also accords with hypothesis 1. Moreover, compared with the coefficient in Table 4, atmosneg has a much stronger impact on the cessation of corporate pollution practices within 1 year after the initial corporate pollution exposure. Furthermore, model 3 shows that the coefficient on the interaction term between the localfocus and atmosneg is also negative and significant ($\beta = -2.40$, $p < 0.05$), which supports hypothesis 2. Consequently, the question of allowing different lengths of time for corporations to react may not be an issue, after all.

Alternative Measure of Focus of Local Media (Localfocus1)

As a robustness measure, we defined the variable localfocus1, as mentioned above, which measures the proportion of local media in the quarter prior to the quarter of exposure.

$$\text{Localfocus1} = \frac{\text{Number of local newspapers reporting on a focal firm}_{t-1} + \text{Number of local newspapers reporting on a focal firm}_t}{\text{Number of newspapers reporting on a focal firm}_{t-1} + \text{Number of newspapers reporting on a focal firm}_t}. \quad (6)$$

The results shown in Table 6 are highly consistent with our main tests. Consequently, the prevalence of local media in the quarter before or in the quarter after the initial exposure of corporate pollution has a similar negative moderating effect on the impact of media negativity on continuing corporate pollution.

Samples Containing the Largest Corporations

We also include the largest corporations into the samples, duplicate the analyses shown in Table 4, and present the results in model 7. In consonance with our hypotheses, we achieve consistent results that verify the power of news atmosphere on the disciplining of corporate pollution practices, even for those largest corporations. Moreover, the coefficient of atmosneg ($\beta = -0.38$, $p < 0.10$) in model 2 of Table 7 is statistically indifferent but less significant than the same coefficient ($\beta = -0.36$, $p < 0.05$) in model 2 of Table 4, which substantiates the notion that news media discipline the pollution practices of small firms better than those of large firms.

Further Studies

This paper assumes two important mechanisms underlying the effect of news atmosphere on disciplining corporate pollution: negative reaction of the local community to

Table 4 Logit estimates of subsequent corporate pollution practices (subseq) after initial corporate pollution exposure

IV	DV					
	Subseq					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Atmosneg		−0.36* (0.14)	−0.41* (0.19)	−0.15** (0.06)	−0.25* (0.12)	0.70 (0.50)
Localfocus * atmosneg			−2.37* (1.03)			
Cover * atmosneg						−1.17* (0.53)
Localfocus	1.40 (0.87)	1.46^{+} (0.87)	1.58^{+} (0.85)	1.00 (0.95)	1.49^{+} (0.89)	1.89* (0.90)
Mediacoverage[a]	0.04 (0.07)	−0.01 (0.08)	−0.03 (0.08)	0.10 (0.11)	0.02 (0.06)	−0.05 (0.08)
$N^{a}_{coverage}$	−0.05 (0.04)	−0.06 (0.04)	−0.06 (0.04)	−0.17 (0.16)	−0.08^{+} (0.05)	−0.04 (0.05)
Ownership	0.67^{+} (0.38)	0.74^{+} (0.38)	0.77* (0.38)	0.54 (0.39)	0.74^{+} (0.41)	0.51 (0.40)
Percentinst[a]	−0.36** (0.14)	−0.37** (0.14)	−0.37* (0.14)	−0.34* (0.14)	−0.35* (0.14)	−0.42** (0.15)
Firm size[a]	−0.01 (0.14)	−0.02 (0.14)	0.02 (0.14)	0.01 (0.14)	−0.02 (0.14)	0.005 (0.15)
Opincgr[a]	0.10 (0.43)	0.04 (0.43)	0.01 (0.44)	−0.17 (0.43)	0.07 (0.42)	−0.20 (0.47)
IMR	−2.23*** (0.65)	−2.22*** (0.66)	−2.10** (0.66)	−2.31*** (0.67)	−2.19** (0.69)	−2.42*** (0.70)
Percentind	−3.59 (2.47)	−3.20 (2.61)	−3.13 (2.63)	−3.54 (2.46)	−3.28 (2.54)	−0.89 (2.86)
Firm age (until 2013)	0.11** (0.03)	0.10** (0.03)	0.10** (0.03)	0.10** (0.03)	0.11** (0.03)	0.11** (0.04)
BorH	−0.09 (0.42)	−0.15 (0.42)	−0.24 (0.42)	−0.08 (0.41)	−0.14 (0.42)	−0.31 (0.42)
Year	Control	Control	Control	Control	Control	Control
Industry	Control	Control	Control	Control	Control	Control
Constant	2.58 (3.59)	3.29 (3.64)	2.69 (3.65)	3.85 (3.85)	2.84 (3.72)	4.20 (4.03)
N	335	335	335	327	335	329
Pseudo-R^2	0.18	0.19	0.20	0.188	0.193	0.22
Log likelihood	−186.34	−183.87	−182.17	−180.63	−183.42	−169.73
Log likelihood for model change		4.94*[b]	3.40^{+}[b]			

Standard errors were in parentheses

*** Statistic significant at the 0.001 level, two-tailed test; ** statistic significant at the 0.01 level, two-tailed test; * statistic significant at the 0.05 level, two-tailed test; $^{+}$ statistic significant at the 0.1 level, two-tailed test

[a] Logarithms

[b] Change of model log-likelihood was calculated based on different of log likelihood of models 1–3 over the previous models

unfavorable media coverage and managers worrying about their reputations. Although we had cited many related studies in our article to support our arguments, we recognize that further empirical investigation would be helpful to visualize and support our proposed mechanisms of how the news atmosphere disciplines corporate pollution.

The Disciplining Effect of News Atmosphere on Firms Important to Local Economy

We assume that the local community would react negatively to those firms polluting. On the other hand, the local community would also be affected negatively if the firm downsized or cut employment in its effort to control pollution. If the focal firms contribute greatly to the local economy, for example through employment, the local community would be reluctantly to blame the focal firms.

Intuitively, a firm with a larger scale of total assets would hire more local employees than a firm with a smaller scale of total assets. Consequently, to test the above hypothesis, we group the observations into two subsamples according to the corporate assets among polluting firms. The upper-quartile subsample includes the focal firms with the largest scale of total assets and the lower-quartile subsample includes the firms with the lowest scale of total assets. Based on these two subsamples, we examine whether the effect of news coverage on disciplining pollution differs according to the focal firm's importance to the local economy, as measured by its size.

As can be seen from the results shown in Table 8, the coefficient on atmosneg is −0.76 ($p < 0.10$) for the upper-quartile subsample (model 1), whereas the coefficient on the atmosneg is −0.68 ($p < 0.10$) for the lower-quartile subsample (model 3). However, these two coefficients are

Table 5 Logit estimates of subsequent corporate pollution practices within 1 year after initial corporate pollution exposures (subseq1)

IV	DV		
	Subseq1		
	Model 1	Model 2	Model 3
Atmosneg		−0.52* (0.21)	−0.64** (0.23)
Localfocus * atmosneg			−2.40* (1.14)
Localfocus	0.03 (0.07)	−0.03 (0.09)	−0.03 (0.09)
Mediacoverage[a]	−0.06 (0.05)	−0.07 (0.05)	−0.07 (0.05)
$N^{a}_{coverage}$	0.76* (0.38)	0.86* (0.39)	0.92* (0.39)
Ownership	−0.24 (0.92)	−0.25 (0.93)	−0.33 (0.98)
Percentinst[a]	−0.28^{+} (0.15)	−0.30^{+} (0.16)	−0.30^{+} (0.16)
Firm size[a]	0.04 (0.13)	0.03 (0.13)	0.05 (0.13)
Opincgr[a]	−0.84^{+} (0.47)	−0.89^{+} (0.47)	−0.90^{+} (0.47)
Inverse Mills ratios	−3.35*** (0.75)	−3.35*** (0.74)	−3.28*** (0.74)
Percentind	−2.41 (2.41)	−1.99 (2.65)	−1.92 (2.70)
Firm age (until 2013)	0.05 (0.03)	0.04 (0.03)	0.04 (0.03)
BorH	−0.16 (0.47)	−0.21 (0.44)	−0.29 (0.44)
Year	Control	Control	Control
Industry	Control	Control	Control
Constant	−8.20* (3.85)	−7.35^{+} (3.86)	−8.29* (3.85)
N	335	335	335
Pseudo-R^2	0.18	0.20	0.21
Log likelihood	−184.29	−180.45	−179.02
Log likelihood for model change		7.68**[b]	2.86^{+}[b]

Standard errors in parentheses

[a] Logarithms

[b] Change of model log-likelihood was calculated based on different of log likelihood of models 1–3 over the previous models

*** Statistic significant at the 0.001 level, two-tailed test; ** statistic significant at the 0.01 level, two-tailed test; * statistic significant at the 0.05 level, two-tailed test; $^{+}$ statistic significant at the 0.1 level, two-tailed test

not significantly different from each other ($p > 0.10$). Hence it seems that employment (as proxied by firm size) is not an important mediator of the effect of media coverage on corporate pollution.

However, when we consider the effect of local news on disciplining corporate pollution, we find that the coefficient on the interaction term between *local news focus* and atmosneg is 14.54 ($p < 0.05$) for the upper-quartile subsample (model 2), whereas the coefficient on the interaction term between *local news focus* and atmosneg is −9.35 ($p < 0.05$) for the lower-quartile subsample (model 4). These two coefficients are also significantly different from each other ($p < 0.05$). These results correspond with previous findings that local news has a stronger effect on smaller firms (e.g., Gurun and Butler 2012). Moreover, among the upper-quartile focal firms, which contribute much to the local economy, decreasing pollution would mean downsizing the firm or cutting employment, which would affect the local community much more negatively compared to the direct damage that pollution would inflict on them. Consequently, the high local economic contribution of focal firms would be a counter-force overriding the effect of local news on disciplining corporate pollution.

It would seem that there are two effects in play, here: one, the negative effect of curtailing pollution on local employment; and two, the negative effect of the pollution itself on the local economy. Our results seem to suggest that for small firms, the second effect is larger than the first effect, leading them to curtail pollution when pressured by the local media. For large firms, on the other hand, the first effect seems to be no less important than the second effect leading to a weak impact of the local media reports on their decision to continue polluting.

Managerial Reputation and the Disciplining Effects of News Atmosphere on Corporate Pollution

We would like to stress managers' overall concern about their reputations. And this concern plays an important part in

Table 6 Logit estimates of subsequent corporate pollution practices with an alternative measurement of focus of local news media (localfocus1)

IV	DV		
	Subseq		
	Model 1	Model 2	Model 3
Atmosneg		−0.39* (0.16)	−0.51* (0.22)
Localfocus1 * atmosneg			−2.12^{+} (1.25)
Localfocus1	−0.02 (0.07)	−0.08 (0.08)	−0.08 (0.08)
Media coverage[a]	−0.04 (0.04)	−0.05 (0.04)	−0.05 (0.04)
N_{coverage}[a]	0.65^{+} (0.38)	0.70^{+} (0.38)	0.70^{+} (0.38)
Ownership	1.62* (0.80)	1.68* (0.79)	1.70* (0.82)
Percentinst[a]	−0.32* (0.14)	−0.33* (0.15)	−0.35* (0.15)
Firm size[a]	0.02 (0.14)	0.02 (0.14)	0.03 (0.14)
Opincgr[a]	0.08 (0.42)	0.03 (0.43)	0.02 (0.43)
Inverse Mills ratios	−2.17** (0.67)	−2.19** (0.68)	−2.07** (0.68)
Percentind	−3.10 (2.41)	−2.73 (2.56)	−2.54 (2.60)
Firm age (until 2013)	0.09** (0.03)	0.09** (0.03)	0.09** (0.03)
BorH	−0.10 (0.44)	−0.18 (0.44)	−0.22 (0.44)
Year	Control	Control	Control
Industry	Control	Control	Control
Constant	2.14 (3.68)	2.79 (3.70)	2.59 (3.73)
N	330	330	330
Pseudo-R^2	0.178	0.190	0.195
Log likelihood	−183.45	−180.80	−179.70
Log likelihood for model change		5.29*[b]	2.21[b]

Due to missing value, the samples reduce to 330. Standard errors were in parentheses

[a] Logarithms

[b] Change of model log-likelihood was calculated based on different of log likelihood of models 1–3 over the previous models

*** Statistic significant at the 0.001 level, two-tailed test; ** statistic significant at the 0.01 level, two-tailed test; * statistic significant at the 0.05 level, two-tailed test; $^{+}$ statistic significant at the 0.1 level, two-tailed test

the effectiveness of news negativity in curtailing their firms' pollution. For example, only if the managers are afraid of their loss of reputation among the community (e.g., if they are managers of multinational firms or state-owned firms) would they mitigate their pollution practices to ingratiate themselves with stakeholders. However, we should also consider the possibility that managers of firms with monopoly power are more likely to ignore stakeholders, which means that news negativity would have relatively little disciplining effect on their pollution practices.

The Disciplining Effect of News Atmosphere on Multinational Firms

The extent of multinational involvement of the focal firm would be a very good measure to measure the importance of corporate reputation for corporate profits, since firms competing on the international market would particularly want to preserve a good reputation among their stakeholders. We introduce a measure of multinational involvement of focal firm which equals the ratio of international market income–total income during a fiscal year. If multinational firms care about their reputation much more seriously, as hypothesized, then the negativity of news reports would have a stronger effect on disciplining their pollution practices.

In order to examine whether multinational involvement of focal firm influences the effect of the news atmosphere on corporate pollution, we construct an interaction term between *multinational distribution of focal firm* and atmosneg. The results in Table 9 substantiate our hypothesis: the coefficient on the interaction term between *multinational distribution of focal firm* and atmosneg is −1.17 ($p > 0.10$) in model 2 and −0.49 ($p < 0.05$) in model 4. These two coefficients are negative, although it is not significant in the model 2, which consist with our theory. Simply speaking, firms with a higher presence in multinational markets care more about their reputations, so

Table 7 Logit estimates of subsequent corporate pollution practices (subseq) after initial corporate pollution exposure including samples of large corporations

IV	DV		
	Subseq (including samples of large corporations)		
	Model 1	Model 2	Model 3
Atmosneg		−0.38^{+} (0.20)	−0.50* (0.21)
Localfocus * atmosneg			−3.50* (1.63)
Localfocus	0.21** (0.07)	0.18* (0.07)	0.17* (0.07)
Mediacoverage[a]	−0.10* (0.04)	−0.12** (0.04)	−0.12** (0.04)
$N^{a}_{coverage}$	0.82* (0.38)	0.88* (0.37)	0.95* (0.38)
Ownership	1.61^{+} (0.93)	1.50 (0.91)	1.57 (0.97)
Percentinst[a]	−0.68*** (0.16)	−0.68*** (0.16)	−0.69*** (0.16)
Firm size[a]	0.28* (0.13)	0.28* (0.13)	0.30* (0.13)
Opincgr[a]	−0.21 (0.46)	−0.22 (0.46)	−0.24 (0.46)
Inverse Mills ratios	−3.03*** (0.78)	−3.10*** (0.81)	−3.00*** (0.81)
Percentind	−4.58^{+} (2.53)	−4.30^{+} (2.60)	−4.04 (2.65)
Firm age (until 2013)	0.08* (0.03)	0.07* (0.03)	0.07* (0.03)
BorH	−0.03 (0.42)	−0.02 (0.42)	−0.08 (0.43)
Year	Control	Control	Control
Industry	Control	Control	Control
Constant	13.89*** (3.92)	14.87*** (3.96)	14.04*** (3.92)
N	420	420	420
Pseudo-R^2	0.283	0.290	0.297
Log likelihood	−190.03	−188.42	−186.43
Log likelihood for model change		3.21^{+b}	3.98*[b]

Standard errors were in parentheses

*** Statistic significant at the 0.001 level, two-tailed test; ** statistic significant at the 0.01 level, two-tailed test; * statistic significant at the 0.05 level, two-tailed test; $^{+}$ statistic significant at the 0.1 level, two-tailed test

[a] Logarithms

[b] Change of model log-likelihood was calculated based on different of log likelihood of models 1–3 over the previous models

much so that that the news media possesses greater power in disciplining their practices.

The Disciplining Effects of News Atmosphere on Firms with Monopoly Power

To measure the monopoly power of focal firm, we consider two aspects: the monopoly power of the firm in its industry, and in the local economy. Reputation plays an important role among firms competing in the marketplace. However, those firms with monopoly power are more likely to ignore how customers as well as other stakeholders perceive them because they possess market power. We propose the firms with low monopoly power that would consider their reputations among stakeholders much more seriously, which would, in turn, guarantee a greater disciplining effect of news atmosphere on their practices.

We use the ratio of the focal firm's total income–the total income of listing firms in its industry to measure *industry monopoly power*, and use the ratio of the focal firm's total income–the total income of all listing firms headquartered in the same region to measure *local economy monopoly power*.

In order to evaluate whether the monopoly power of focal firms affects the impact of news atmosphere on corporate pollution, we group the observations into two subsamples according to the rank of corporate monopoly power among polluting firms. The upper-quartile subsample includes the focal firms with the greatest monopoly power and the lower-quartile subsample includes the firms with the weakest monopoly power.

We provide the results in regard to the two subsamples in Table 10. We see in Table 10 that the coefficient on atmosneg is −0.11 ($p > 0.10$) in model 1 for the upper-quartile subsample, whereas the coefficients on the atmosneg is −0.83 ($p < 0.05$) in model 3 for the lower-quartile subsample. A further test confirms that the difference between these two coefficients is significant

Table 8 Logit estimates of the disciplining effect of news atmosphere on firms important to local economy

IV	DV			
	Upper-quartile subsample		Lower-quartile subsample	
	Model 1	Model 2	Model 3	Model 4
Atmosneg	−0.76 (0.59)	0.10 (0.57)	−0.68^{+} (0.39)	−1.03* (0.51)
Localfocus * atmosneg		14.54* (6.73)		−9.35* (4.32)
Localfocus	5.42^{+} (3.22)	7.85* (3.75)	−0.31 (2.16)	−0.37 (2.11)
Mediacoverage[a]	−0.05 (0.20)	0.00 (0.19)	−0.17 (0.29)	−0.18 (0.27)
$N^{a}_{coverage}$	−0.11 (0.14)	−0.12 (0.15)	−0.11 (0.15)	−0.09 (0.13)
Ownership	0.45 (1.09)	0.63 (1.08)	1.62 (1.08)	1.84^{+} (0.95)
Percentinst[a]	−0.61 (0.42)	−0.65 (0.48)	−0.06 (0.33)	−0.14 (0.32)
Firm size[a]	1.76** (0.68)	1.77* (0.71)	1.25 (1.53)	2.45 (1.64)
Opincgr[a]	−2.02 (1.42)	−2.36 (1.45)	−0.02 (1.21)	0.87 (1.41)
Inverse Mills ratios	−2.40 (2.14)	−1.61 (2.03)	−4.18* (1.91)	−3.47^{+} (1.90)
Percentind	−9.09 (8.63)	−8.61 (8.72)	6.19 (7.62)	10.46 (7.87)
Firm age (until 2013)	0.21** (0.07)	0.22** (0.08)	0.10 (0.10)	0.07 (0.09)
BorH	−3.06** (1.17)	−3.00** (1.13)	−2.91 (2.34)	−3.03 (2.15)
Year	Control	Control	Control	Control
Industry	Control	Control	Control	Control
Constant	−26.99^{+} (15.60)	−27.41^{+} (16.31)	−23.67 (32.32)	−54.19 (36.79)
N	84	84	84	84
Pseudo-R^2	0.250	0.267	0.347	0.388
Log likelihood	−38.00	−38.08	−35.63	−33.40
Log likelihood for model change		1.84[b]		4.48*[b]

We group the observations into two subsamples according to corporate assets among polluting firms. Standard errors were in parentheses

*** Statistic significant at the 0.001 level, two-tailed test; ** statistic significant at the 0.01 level, two-tailed test; * statistic significant at the 0.05 level, two-tailed test; $^{+}$ statistic significant at the 0.1 level, two-tailed test

[a] Logarithms

[b] Change of model log-likelihood was calculated based on difference of log likelihood of models 2–1 and 4–3

($p < 0.10$). The results confirm that a negative news atmosphere has a stronger disciplining effect on firms with low monopoly power, who care much more about their reputations.

When we look at the local news effect on disciplining corporate pollution, this effect is even more pronounced. The coefficient on the interaction term between *local news focus* and atmosneg is −6.89 ($p > 0.10$) in model 2 for the upper-quartile subsample, whereas the coefficient on the interaction term between *local news focus* and atmosneg is −8.51 ($p < 0.10$) in model 4 for the lower-quartile subsample. These results confirm the hypothesis that local news has a marginally stronger effect on firms with low monopoly power. The upper-quartile focal firms (those with high monopoly power) do not respond to media pressure because they are not afraid that the customer will stop buying their products; their strong monopoly power is a counter-force overriding the broader effect of local news on corporate pollution practices. Following a similar procedure, we duplicate the tests based on the measure of *local economy monopoly power*, which are consistent with the results above.

The Disciplining Effects of News Atmosphere on Firms with Political Connection

We hypothesize that, in general, managers in state-owned firms are more likely to care about their local reputation than managers of privately owned firms. Consequently, media pressure would have a stronger effect on disciplining pollution by state-owned firms than by other firms. To test this relationship, we divide the samples into two groups according to whether the focal firm is state owned or not. The results are shown in Table 11.

According to the results shown in Table 11, although the negative atmosphere overall has a marginally stronger

Table 9 Logit estimates of the disciplining effect of news atmosphere on multinational firms

IV	DV			
	DV based on all reportages		DV based on pollution articles	
	Model 1	Model 2	Model 3	Model 4
Atmosneg	−0.36* (0.14)	−0.36* (0.16)	−0.15** (0.06)	−0.13* (0.06)
Multinational involvement * atmosneg		−1.17 (0.90)		−0.49* (0.24)
Multinational involvement	0.50 (0.73)	0.52 (0.73)	0.65 (0.77)	0.85 (0.84)
Mediacoverage[a]	−0.02 (0.08)	−0.01 (0.08)	0.10 (0.11)	0.11 (0.11)
$N^{a}_{coverage}$	−0.06 (0.04)	−0.06 (0.04)	−0.18 (0.16)	−0.18 (0.16)
Ownership	0.74* (0.38)	0.71^{+} (0.37)	0.54 (0.38)	0.50 (0.39)
Localfocus	1.41 (0.88)	1.46 (0.90)	0.94 (0.96)	1.00 (0.97)
Percentinst[a]	−0.36* (0.14)	−0.37** (0.14)	−0.33* (0.14)	−0.34* (0.14)
Firm size[a]	−0.01 (0.14)	−0.01 (0.14)	0.02 (0.14)	0.01 (0.14)
Opincgr[a]	−0.01 (0.44)	−0.01 (0.44)	−0.22 (0.45)	−0.32 (0.46)
Inverse Mills ratios	−2.23*** (0.66)	−2.17*** (0.65)	−2.31*** (0.67)	−2.22*** (0.66)
Percentind	−3.19 (2.60)	−3.08 (2.50)	−3.55 (2.44)	−3.66 (2.47)
Firm age (until 2013)	0.10** (0.03)	0.10** (0.03)	0.10** (0.03)	0.10** (0.03)
BorH	−0.21 (0.43)	−0.21 (0.44)	−0.15 (0.42)	−0.18 (0.43)
Year	Control	Control	Control	Control
Industry	Control	Control	Control	Control
Constant	3.50 (3.64)	3.21 (3.60)	4.05 (3.87)	4.61 (3.90)
N	335	335	327	327
Pseudo-R^2	0.192	0.195	0.189	0.194
Log likelihood	−183.70	−182.96	−180.35	−179.22
Log likelihood for model change		1.49[b]		2.26[b]

Standard errors were in parentheses

*** Statistic significant at the 0.001 level, two-tailed test; ** statistic significant at the 0.01 level, two-tailed test; * statistic significant at the 0.05 level, two-tailed test; $^{+}$ statistic significant at the 0.1 level, two-tailed test

[a] Logarithms

[b] Change of model log-likelihood was calculated based on difference of log likelihood of models 2–1 and 4–3

effect on disciplining pollution in privately owned firms ($\beta = -0.82$, $p < 0.10$) than in state-owned firms ($\beta = -0.32$, $p < 0.10$), local news, which functions through influencing the local reputation of managers, has a stronger and significant effect on stopping pollution in state-owned firms ($\beta = -3.95$, $p < 0.01$) than in privately owned firms ($\beta = 3.47$, $p > 0.10$). These results confirm that reputation in the local community matters much for managers in state-owned firms. In other words, the power of local news over corporate practices depends on how much managers care about their reputation in the local community. Managers of state-owned firms seem to be more concerned about their local reputations than managers of private firms; perhaps they are more susceptible to the displeasure of local government officials.

The Role of Positive News Reports on Disciplining Corporate Pollution

Additionally, we would like to provide some evidence regarding the issue of whether positive news reports have similar disciplining effects on corporate pollution. Generally, we assume a firm with positive reportages would like to sustain their good images among community and that cease pollution.

We consider the role of positive news reports on disciplining corporate pollution as well as reaction to the cessation of corporate pollution. Following a procedure similar to the one described in the manuscript, we construct a measure of news positive atmosphere (atmospos) and substitute it for the independent variable shown in model 2 of Table 4. The results are shown in model 1 of Table 12.

Table 10 Logit estimates of the disciplining effects of news atmosphere on firms with monopoly power

IV	DV			
	Upper-quartile subsample		Lower-quartile subsample	
	Model 1	Model 2	Model 3	Model 4
Atmosneg	−0.11 (0.66)	−0.66 (0.66)	−0.83* (0.37)	−1.47* (0.69)
Localfocus * atmosneg		−6.89 (5.00)		−8.51^{+} (4.78)
Localfocus	1.94 (2.48)	0.95 (2.78)	0.67 (1.81)	0.77 (1.83)
Mediacoverage[a]	0.15 (0.17)	0.24 (0.19)	−0.34 (0.24)	−0.31 (0.24)
$N^{a}_{coverage}$	−0.10 (0.12)	−0.12 (0.13)	−0.05 (0.11)	−0.05 (0.10)
Ownership	−1.18 (1.03)	−1.04 (1.01)	1.95* (0.86)	2.34* (0.96)
Percentinst[a]	−0.59 (0.40)	−0.71^{+} (0.43)	0.02 (0.33)	0.01 (0.36)
Firm size[a]	0.05 (0.44)	−0.04 (0.44)	0.66 (0.69)	0.75 (0.69)
Opincgr[a]	−1.11 (1.63)	−0.53 (1.50)	−0.07 (1.09)	0.62 (1.15)
Inverse Mills ratios	−0.59 (1.86)	−0.23 (1.88)	−3.04* (1.42)	−2.69^{+} (1.57)
Percentind	8.43 (8.08)	6.76 (7.93)	−14.88 (15.76)	−20.75 (16.24)
Firm age (until 2013)	0.18^{+} (0.10)	0.18^{+} (0.09)	0.14^{+} (0.08)	0.15^{+} (0.09)
BorH	−0.27 (0.81)	−0.15 (0.87)	0.00 (0)	0.00 (0)
Year	Control	Control	Control	Control
Industry	Control	Control	Control	Control
Constant	17.60 (15.65)	15.37 (15.07)	−21.84 (15.06)	−26.41^{+} (14.96)
N	84	84	84	84
Pseudo-R^2	0.232	0.246	0.282	0.311
Log likelihood	−41.02	−40.25	−39.30	−37.74
Log likelihood for model change		1.55[b]		3.13^{+}[b]

We group the observations into two subsamples according to the rank of corporate industry monopoly power among polluting firms. Standard errors were in parentheses

*** Statistic significant at the 0.001 level, two-tailed test; ** statistic significant at the 0.01 level, two-tailed test; * statistic significant at the 0.05 level, two-tailed test; $^{+}$ statistic significant at the 0.1 level, two-tailed test

[a] Logarithms

[b] Change of model log-likelihood was calculated based on difference of log likelihood of models 2–1 and 4–3

However, the results do not provide support that positive atmosphere ($\beta = -0.03$, $p > 0.10$) would help for disciplining corporate pollution.

Moreover, we would expect that, for companies engaged in positive corporate change, managers would want this publicized, especially if the mechanism at stake involves reputation. However, managers would not be able to anticipate how journalists might report these changes; in addition, journalists might not care about these changes. In any case, this is an empirical question: does the media, indeed, report more positively about focal firms, which cease pollution, than about firms that continue to pollute? To control for the potential confounding influence of other corporate events on positive news coverage, we restrict the window to two quarters after the exposure of corporate pollution (subseq2) and explore whether during these two quarters those firms ceasing to pollute attract more positive news reports (atmospos) than those continuing to pollute. We provide the results shown in model 2 of Table 12. However, the results do not support the hypothesis that news media reward firms ($\beta = -0.169$, $p > 0.10$) that cease to pollute with positive reports. Even though this does not directly provide supporting evidence for our theory, this may be because the media tends to focus more on negative coverage than on positive coverage. Furthermore, positive media reportage is not a necessary concomitant of a positive public reaction to pollution cessation.

We submit that the additional evidence that we have submitted further supports the hypothesis that the local community's negative reaction to corporate pollution as well as managers' concern for their reputation plays important roles in bolstering the effect of news reportage on disciplining corporate pollution. What we have shown indicates that the nature of this discipline varies according to the nature of the polluting firm—whether it has monopoly power, whether it is state owned, whether it has international sales, etc.

Table 11 Logit estimates of the disciplining effects of news atmosphere on firms with political connection

IV	DV			
	Privately owned firms		State-owned firms	
	Model 1	Model 2	Model 3	Model 4
Atmosneg	−0.82^{+} (0.51)	−0.65^{+} (0.35)	−0.32^{+} (0.18)	−0.31 (0.22)
Localfocus * atmosneg		3.47 (2.71)		−3.95** (1.42)
Localfocus	−2.04 (3.23)	−1.88 (3.34)	2.39* (1.07)	2.60* (1.04)
Mediacoverage[a]	−0.08 (0.15)	−0.08 (0.14)	0.06 (0.09)	0.02 (0.08)
$N^{a}_{coverage}$	0.02 (0.13)	0.01 (0.13)	−0.10^{+} (0.05)	−0.10^{+} (0.05)
Percentinst[a]	−0.72* (0.29)	−0.74* (0.30)	−0.27 (0.18)	−0.28 (0.18)
Firm size[a]	−0.42 (0.41)	−0.51 (0.43)	−0.06 (0.17)	−0.02 (0.17)
Opincgr[a]	−1.90* (0.88)	−1.94* (0.91)	0.47 (0.63)	0.37 (0.65)
Inverse Mills ratios	−5.75^{+} (3.07)	−6.61^{+} (3.47)	−1.56* (0.73)	−1.65* (0.74)
Percentind	−16.18 (12.18)	−17.80 (13.06)	−1.91 (3.25)	−2.17 (3.24)
Firm age (until 2013)	0.03 (0.07)	0.04 (0.07)	0.13** (0.05)	0.13** (0.05)
BorH	0.00 (.)	0.00 (.)	−0.32 (0.44)	−0.42 (0.45)
Year	Control	Control	Control	Control
Industry	Control	Control	Control	Control
Constant	33.39** (11.94)	37.02** (14.12)	29.44*** (4.59)	30.39*** (4.57)
N	86	86	249	249
Pseudo-R^2	0.342	0.349	0.195	0.211
Log likelihood	−37.56	−37.11	−127.80	−125.22
Log likelihood for model change		0.88[b]		5.15*[b]

Standard errors were in parentheses

*** Statistic significant at the 0.001 level, two-tailed test; ** statistic significant at the 0.01 level, two-tailed test; * statistic significant at the 0.05 level, two-tailed test; $^{+}$ statistic significant at the 0.1 level, two-tailed test

[a] Logarithms

[b] Change of model log-likelihood was calculated based on difference of log likelihood of models 2–1 and 4–3

Discussion

The governance role of the news media in business has received enormous attention. However, few studies have looked at the effect of the news media in ameliorating undesirable business practices. In this paper, we provide convincing evidence that the news media does play such a role and that it does so effectively in a Chinese context. Furthermore, we find that the local media plays a particularly important role in this matter that has not been previously studied.

This study focuses on how an atmosphere of negative coverage after initial reports of corporate pollution influences subsequent corporate pollution practices. We propose that an atmosphere of negative coverage after initial reports of pollution events reduces subsequent pollution. Moreover, we find that attention from local media strengthens this effect. We use empirical analyses of listed Chinese firms' pollution practices during 2004–2012 and news reports from more than 600 newspapers to support our arguments. We elaborate on the theoretical contributions and practical implications below.

Theoretical Contributions

Enriching the Agenda-Setting Theory

Researchers widely use the agenda-setting theory to analyze how the news media influences public opinion (e.g., Bednar et al. 2013). According to Weaver et al. (2004) and McCombs (2005), the first level of agenda-setting theory focuses on the relative salience of an issue (e.g., perceived importance), which emphasizes how the news media makes certain issues more easily accessible to the public; that is, it makes decisions about *what* should people think about. The second level of agenda-setting theory examines the relative salience of issue attributes; that is, the news media influences *how* the public thinks about the issue.

Priming an agenda means that news reports increase the salience of a specific attribute, which the public uses to form opinions on an issue. Recent studies propose enriching the agenda-setting theory by exploring how the news media shapes public opinion in the real world (Scheufele and Tewksbury 2007). We contribute to filling this research

Table 12 The interrelationship between positive coverage and subsequent corporate pollution practices (subseq2)

IV	DV	
	The disciplining effect of positive coverage Model 1	Positive coverage after firm ceasing pollution Model 2
Atmospos	−0.03 (0.12)	
Subseq2		−0.169 (0.358)
Mediacoverage[a]	0.03 (0.08)	−0.097 (0.081)
$N^{a}_{coverage}$	−0.05 (0.04)	−0.063 (0.057)
Ownership	0.67^{+} (0.38)	−1.050* (0.516)
Atmosneg		−0.714** (0.220)
Localfocus	1.41 (0.87)	0.391 (1.260)
Percentinst[a]	−0.36* (0.14)	0.202 (0.154)
Firm size[a]	−0.01 (0.14)	0.488* (0.188)
Opincgr[a]	0.10 (0.42)	1.066^{+} (0.599)
Inverse Mills ratios	−2.21*** (0.65)	1.518 (1.187)
Percentind	−3.56 (2.49)	−8.445* (3.666)
Firm age (until 2013)	0.10** (0.03)	0.007 (0.049)
BorH	−0.10 (0.43)	−1.487* (0.630)
Constant	2.52 (3.59)	−8.14 (5.103)
N	335	335
Pseudo-R^2	0.18	0.21

Standard errors were in parentheses

*** Statistic significant at the 0.001 level, two-tailed test; ** statistic significant at the 0.01 level, two-tailed test; * statistic significant at the 0.05 level, two-tailed test; $^{+}$ statistic significant at the 0.1 level, two-tailed test

[a] Logarithms

gap. We propose that whether the public thinks about a subject (CEOs, in our case) with a particular attitude (priming effect of news agendas) influences how the subject views the consequences of its future conduct.

According to our study, an increase in negative coverage after initial reports of corporate pollution events constitutes a priming factor that generates an atmosphere of negativity in the general public toward the firm. The atmosphere of negativity influences how CEOs perceive the public's reaction to their subsequent pollution practices (hypothesis 1). We propose that priming a negative attitude toward a firm makes CEOs fear personal losses from subsequent pollution activities. Managers recognize that reducing subsequent corporate pollution is desirable, because it means corporate survival and preserves their reputations.

Additionally, previous studies introduce the agenda-setting theory to understand how news reports affect corporate reputations (e.g., Carroll and McCombs 2003; Meijer and Kleinnijenhuis 2006), corporate philanthropy (e.g., Brammer and Millington 2005; Gan 2006), and similar practices (Zavyalova et al. 2012). We add to this stream of research by considering the relationship between news media coverage and corporate pollution practices. Agenda-setting theory contributes to our understanding of the governance role of news media on various corporate behaviors in modern society, which accords with the social norm of promoting social responsibility within the news media.

Extension to the Literature on Media Governance

An important aspect of the study of the media's governance effect on business is to design a proper measure of media coverage. Previous studies assume that each news report has an identical influence on audiences, because they generally lump the reports together (e.g., Pollock and Rindova 2003; Pollock et al. 2008). In fact, each news report differs in its use of words; moreover, the public makes sense of news reports not only based on what they currently know, but also based on what they have known before.

We relax this assumption by modifying the measurement of media coverage in two ways. First, *changes* in news tenor attract attention to certain issues; we therefore introduce a relative measurement to capture the dynamic aspect of media reports about a firm. Second, a long negative report would provide more details than a short negative report, which better primes the public's attitude (Bushee et al. 2010); we thus introduce the concept of word count to capture differences among negative reports.

Furthermore, even though the public has specific preferences for different information sources, scholars largely ignore geographic differences among local news media sources and assume the news media has a homogenous effect on audiences (Miller and Shanthikumar 2010). However, the local media is generally the dominant information source for the local public and thus has a much stronger impact on local stakeholders compared with other news media (e.g., Engelberg and Parsons 2011; Gurun and Butler 2012; Hong et al. 2008). We use a very comprehensive source of news reports in China (more than 600 newspapers), and our results strongly support the notion that the geographic location of the news media influences the effects the news media on governance (hypothesis 2).

Consequently, we extend previous studies by introducing a comparative element in the evaluation of the news media's effect. We calculate the change in the proportion of negative words in news reports to determine the negative attitude toward a firm in a specific period, and we consider the geographic location of the local news media. These innovations reflect several insights into the power of the news media. First of all, no single news report, especially after corporate misbehavior occurs, generates a negative atmosphere that inviting strong public scrutiny; however, a

sequence of reports does. Second, the local news media has a strong influence on local companies.

Extension of the Literature on Corporate Misconduct

Previous studies of corporate misconduct explore the antecedents and consequences of misbehavior (a thorough literature review can be found in Greve et al. 2010). The antecedents of corporate misconduct include firm-, industry-, and country-level factors. Recent studies suggest studying the watchdog role of the news media in corporate misconduct (e.g., Bednar 2012; Dyck et al. 2008). We answer this call by emphasizing the role of news reports in containing pollution (hypothesis 1).

Practical Implications

The serious pollution in China warrants consideration of ways to mitigate it. This study suggests that the media can be an important partner to the government in achieving this objective, particularly via negative coverage of corporate pollution incidents, which influences public opinion and in turn affects polluters' ability to pollute. We emphasize the importance of word use in negative news reports (according to hypothesis 1), such as providing details and dramatic narrative. We find that simply citing or reprinting other newspapers' negative reports also helps achieve these goals. Our results make it clear that the local media has an important effect on what happens in corporate boardrooms. The normative implications from our study are that governments should actively partner with the media, particularly the local media, to attack and thus reduce pollution. We find that it is particularly important to use local media to highlight the negative effects of corporate pollution (following hypothesis 2). Furthermore, we find that when the local and national news media cooperate, they create a negative atmosphere that pressures managers who, acting in their own self-interest, cease polluting activities. Presumably, such a strategy could help reduce other types of corporate misbehavior, as well.

Although the Chinese government censors certain news topics, it does encourage the media to report on various sensitive topics, on which the public demands information. Pollution and environmental issues are among these topics. Journalists, especially at local newspapers, often have information advantages and can devote great effort to exploring pollution activity. Their news reports not only help the government to reduce and regulate corporate pollution, but also they attract reader traffic and thus more profits.

Accordingly, CEOs would be well advised to look for changes in news coverage and react quickly. We provide an index of news atmosphere (Eq. 1) that CEOs can strategically use to guide corporate practices. According to hypothesis 1, a large index value indicates serious public concern and government attention to corporate pollution practices. CEOs should take immediate action to prevent future pollution in those cases. Moreover, according to hypothesis 2, CEOs of firms attracting a lot of attention from the local media before or after initial reports of pollution events may suffer considerable reputational damage from subsequent pollution.

Suggestions for Future Research

We have several suggestions for further research. In our study, we provide supplementary evidence as to how the local community's reaction to media reportage might influence the power of news atmosphere to discipline corporate pollution. For example, when focal firms contribute greatly to the local community, news negativity has little effect on stopping corporate pollution. Future studies could consider how the strength of the connection between focal firms and the local community might undermine the power of news atmosphere as well as local news focus in disciplining irresponsible corporate practices.

Additionally, our new evidence supports the notion that managers of different firms care differently about their reputations in the community. Further studies could incorporate these managerial factors to examine their impact on the disciplining power of the news media.

In this study, we looked at the negativity of news media reports and provided several anecdotes to explore the effect of positive reportage. Considering that there may be collusion between the corporate sector and the news media, it is important to look at positive media reports as well, since they may offset the negative media reports. It is possible that positive media coverage of pro-social behavior might affect corporate behavior differently from negative media coverage of antisocial corporate behavior. This would be worth investigating.

Moreover, we did not investigate the financial and political connections of news media; these might very well affect reporting of antisocial corporate events in the first place and shield firms from negative coverage following initial exposure. Further study along these lines would enrich our understanding of the impact of media coverage on corporate behavior.

Our study also did not look at the effect of pictorial and other graphic supplements to media coverage; it would be worth seeing if these have a greater impact than verbal reportage. Social media has become very important in daily life and probably has a strong impact on corporate behavior. We tried to collect some data regarding how social media disseminate news regarding focal firms. Given that SINA Weibo is the dominant platform of social media in

China, we introduced several keywords to search for related information. Unfortunately, we did not get any meaningful tweets. This may be because SINA Weibo was established in 2010, whereas our sample period ranges from 2004 to 2011; this would limit the effect of Weibo as a news disseminator for this study.

However, we do believe, as the reviewer has proposed, that social media is very likely an important conduit to connect audiences with firms and consequently is important in influencing corporate practice. For the time period after the establishment of SINA Weibo, social media probably does play an increasingly important role in disciplining corporate pollution as well as other irresponsible practices. We propose this as an important direction for future research.

Although the Chinese government does censor news coverage, the media is not entirely under government control; in fact, the Chinese government even encourages news organizations to expose and discipline corporate pollution practices. Consequently, we believe our results are generalizable to Western countries.

Nevertheless, it would be useful to look at the extent of governmental connections across focal firms to see if this moderates the effect of news media on corporate misbehavior, such as financial fraud. Finally, it might be marginally useful to identify the date of pollution events more precisely than we have been able to do in our present study.

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