Institutional Investors and Corporate Social Responsibility Policies

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Abstract

We use the Toxic release data from the U.S. Environmental Protection Agency to analyze the effect of institutional investors on corporate social responsibility policies. We find that local institutional ownership reduces the amount of toxic chemicals released by local facilities into the environment. The abatement effect diminishes monotonically as the distance between an institution and a facility grows and is concentrated in dedicated and independent institutions. Further, pollution abatement enhances firm value for firms with high local institutional ownership. The positive valuation effect is larger if firms face higher levels of customer awareness or if local ownership is concentrated in dedicated or independent institutions. Our results support Jensen (2001)'s theory of enlightened value maximization that maximizing long-term firm value aligns the interests of shareholders and other stakeholders.

JEL classification: D22; G34; M14

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1. Introduction

Social and economic developments such as globalization and social media have created a new sense of a shrinking community. As one of the most influential members of the community, corporations are under increasing pressure from regulators and various interest groups to be socially responsible. As evidence of this movement, at the start of 2010, assets in socially screened funds in the United States were $3.07 trillion, an increase of more than 380% from 1995. Increasingly, top executives are incorporating environmental and social issues into their firms' core strategies because failure to do so can rapidly destroy firm value. A recent example is the BP oil spill, which began on April 20, 2010 and was stopped on July 15, 2010. During this period, BP's stock price fell from $60.48 to a low of $27.05. As of February 2013, BP had paid $42.2 billion in criminal and civil settlements in relation to the spill.[1]

Despite the growing importance of corporate social responsibility (CSR), we know little about whether shareholders have any influence over CSR decisions. The answer to this question is important given the debate regarding CSR. Specifically, some scholars argue that CSR activities promote firm value by lowering contracting costs and delivering product-differentiation advantages to firms (see, e.g., McWilliams and Siegel, 2000; Servaes and Tamayo, 2013), while others argue that CSR activities make inefficient use of corporate resources and frequently cloak the actions that managers and special interest groups take to extract private benefits from shareholders (Friedman, 1970; Barnea and Rubin, 2010).

In this paper, we address whether shareholders influence CSR decisions by analyzing the relation between facility level release of toxic chemicals and proxies for shareholder interests and preferences, namely the location of institutional investors, the stock holdings of institutions,

[1] BP Fighting A Two Front War As Macondo Continues To Bite And Production Drops, Forbes, 2/5/2013, http://www.forbes.com/sites/afontevecchia/2013/02/05/bp-fighting-a-two-front-war-as-macondo-continues-to-bite-and-production-drops/, last accessed on 12/15/2013.

and institution type. Toxic release data come from the Toxic Release Inventory (TRI) Database maintained by the U.S. Environmental Protection Agency (EPA). We use the TRI data to proxy for CSR activities for three reasons. First, as a classic example of negative externality, pollution should fall outside the domain of corporate activities according to the traditional theory of the firm (Coase, 1937; Alchian and Demsetz, 1972). However, environmental protection is one of the social issues that firms are most pressured to improve. Therefore, the emission of toxic chemicals encapsulates the conflict between CSR and shareholder value maximization and gives us the desired laboratory to analyze how responsive CSR activities are to shareholder interests and preferences. Second, TRI data are available at the facility level. This permits a more accurate measure of shareholder interests and preferences than firm-level CSR proxies such as the Kinder, Lydenberg & Domini (KLD) rating of corporate social performance. Last, the TRI data deliver the advantage of objectivity, because facilities are legally required to report their annual release of toxic chemicals to the EPA. This is in contrast to a CSR rating, the accuracy of which depends on the evaluation metric of the rating agency.

Our primary measure of shareholder interests and preferences is the distance between the location of institutional investors and the location of the facility that emits toxic chemicals into the environment. Geographic proximity is an ideal barometer for the intensity of shareholder interests and preferences because it directly correlates with information acquisition and processing costs.[2] If shareholders prefer certain CSR policies local shareholders should have

[2] A large body of work has found that geographic distance increases monitoring costs and information acquisition and processing costs. For example, the portfolio literature shows that distance is a key driver behind investors' portfolio decisions for reasons including asymmetric information and monitoring costs (see, e.g., Coval and Moskowitz, 1999). The banking literature shows that distance impacts lending decisions (see, e.g., Petersen and Rajan, 2002). The literature on venture capital shows that distance is an important determinant of contract design and governance arrangements (see, e.g., Lerner, 1995). Ayers, Ramalingegowda, and Yeung (2011) find that managers are less likely to use financial reporting discretion in the presence of local monitoring institutions than distant monitoring institutions. Alam, Chen, Ciccotello, and Ryan (2012) find that distance affects information acquisition and decision-making by the board of directors.

information and monitoring advantages over distant peers in influencing firms to adopt the preferred CSR policies. We focus on institutions because the existing literature (e.g., Hartzell and Starks, 2003; Aggarwal, Erel, Ferreira, and Matos, 2011) shows that they are sophisticated investors and have economic incentives to monitor managers. To provide a portfolio of evidence, we also augment location data with institutional ownership and institution type, which are the conventional proxies for shareholder negotiation power and monitoring incentives (Hartzell and Starks, 2003; Chen, Harford, and Li, 2007).

We find that when local institutions (measured as institutions located within 150 miles of the facility) own a larger equity stake, the facility releases a lower quantity of toxic chemicals. Specifically, a one-percentage increase in local institutional ownership is associated with a 2.950% reduction in the total amount of toxic chemicals released into the environment. As some facilities transfer chemicals away to be treated at specialized waste management facilities, we decompose the total amount of toxic chemicals released by a facility into hazardous waste management conducted on site and off site. If geographic proximity indeed captures savings on information and monitoring costs, the abatement effect of local institutional ownership should be stronger for on-site than for off-site release. We find that a one-percentage increase in local institutional ownership reduces on-site release by 2.937% but has no impact on off-site release. For additional evidence, we measure local institutions at various distances and find that the abatement effect of local ownership diminishes monotonically both in magnitude and in statistical significance as the distance between an institution and a facility grows.

If firms adjust environmental policies in response to shareholder interests and preferences, the amount of toxic release may also vary systematically by institution type. Following Bushee (2001), we classify local institutions into dedicated and transient. We find that the ownership of dedicated local institutions reduces the amount of toxic release, while the ownership of transient local institutions does not. This result is consistent with the idea that dedicated institutions are long-term investors and wield negotiation power greater than transient institutions. We also classify local institutions into independent and grey based on Brickley, Lease, and Smith (1988), who define the former as mutual funds and independent investment advisors and the latter as bank trusts, insurance companies, and other institutions. We find that the ownership of independent local institutions negatively affects the amount of toxic release, but the ownership of transient local institutions does not. This result is consistent with the notion that independent institutions are more active monitors than grey institutions. We conduct a battery of tests to check the robustness of our results, including using alternative measures of toxic release, various types of causality checks, and controlling for regulation, location, and management incentives. Our results hold in each robustness test.

Although the end goal of any pollution abatement policy is reduction in the total amount of toxic release, it is useful to understand the effect of local institutional ownership on firms' efforts to reduce toxic release. Therefore, we also analyze the impact of local institutional ownership on the residual amount of toxic release, a measure that we construct to proxy firms' pollution abatement efforts. Specifically, the residual amount of toxic release is the actual amount of toxic release minus the predicted amount of toxic release that we estimate based on facility size, industry, and year. Consistent with our earlier findings, local institutional ownership lowers the residual amount of toxic release, and the effect is driven by on-site release. Further, local institutional ownership reduces pollution more when the actual amount of toxic release exceeds the predicted amount.

Finally, we study the economic incentives that local institutions may have to influence corporate pollution abatement policies. For this analysis, we aggregate facility-level data to firm-level. We find that pollution abatement increases firm value when local institutional ownership is high. This positive valuation effect is stronger for firms with high levels of customer awareness and is only present for stock holdings of local dedicated and independent institutions. Therefore, the evidence is consistent with the view that CSR can enhance firm value under certain conditions and that shareholder input may be important in identifying those conditions.

Our paper makes three contributions. First, albeit vast, the literature on CSR has so far focused on the interaction between firms and "outside" stakeholders such as regulators, customers, and green activists.[3] Our results add a critical dimension to the literature by analyzing the role and economic incentives of shareholders in shaping CSR. Second, the paper contributes to the debate regarding CSR. The demand for CSR has grown exponentially in recent years thereby posing challenges to researchers and managers because under the conventional view, the objective of financial managers is to maximize shareholder value but the standard definition of CSR is sacrificing profits in the name of social interest (Bénabou and Tirole, 2010). We find that pollution abatement can increase firm value for firms with high levels of local institutional ownership. Therefore, our paper adds to the growing body of literature (e.g., Jiao, 2010; Edmans, 2011) that finds empirical evidence for Jensen's theory of enlightened value maximization. Jensen (2001) argues that firms should consider the interests of all stakeholders but use the criterion of maximizing long-term firm value to make trade-off decisions among stakeholders. Finally, our paper relates to the literature on spatial economics, which shows that geographic distance plays a key role in economic activities (Krugman, 1998).

[3] For studies on the interaction between firms and regulators, see, e.g., Maxwell, Lyon, and Hackett (2000); between firms and customers see, e.g., Servaes and Tamayo (2013) and Delmas and Montiel (2009); and between firms and green activists see, e.g., Lenox and Eesley (2009).

The remainder of the paper is organized as follows. Section 2 describes the data and sample collection. Sections 3 and 4 analyze the impact of local institutional ownership on the total amount of toxic release and the residual amount of toxic release. Section 5 studies the economic incentives of local institutions in influencing a firm's pollution abatement policies. Section 6 concludes.

2. Data and sample description

2.1.Data

We obtain toxic release data from the EPA's TRI database. TRI was established by Section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) and was later expanded by the Pollution Prevention Act of 1990. TRI contains information on disposal and other releases of over 650 toxic chemicals from more than 50,000 U.S. industrial facilities (including facilities owned by privately held companies) that have reported at least once since TRI was launched in 1986. Facilities with ten or more employees that produce or use above-a-threshold amount of chemicals on the EPA's substance list must report their annual release of these chemicals to the EPA, which then provides the information to the public through TRI. Over the years, the TRI data have become the standard metric of measuring a U.S. firm's waste generation and pollution reduction activities. It is widely used by regulators, journalists, and environmental activists (Hamilton, 1995). Many academic papers have utilized the database to study CSR activities and used toxic release to measure corporate social performance. For example, Maxwell et al. (2000) use TRI to study the relation between regulation and social welfare. Dooley and Lerner (1994), Hart and Ahuja (1996), and King and Lenox (2000 and

2002) use TRI to study the relation between corporate social performance and corporate financial performance.[4]

We then merge the TRI data with the National Establishment Time-Series (NETS) Database to obtain facility size, with the CRSP-Compustat Merged Database to retrieve financial and stock price information, and with the Thomson-Reuters Institutional Holdings (13F) Database to obtain institutional ownership. The final sample consists of 820 unique firms, 5,493 unique facilities, and 42,658 facility-year observations from 1994 to 2010.

To compute distance, we obtain the zip codes of facility locations from the TRI database, and the zip codes of institution locations mainly from the U.S. Securities and Exchange Commission (the SEC Edgar) website, supplemented with the websites of institutional managers. We collect the latitude and longitude of the zip codes from the U.S. Census Bureau's Gazetteer Place and Zip Code Database. Following prior research (see, e.g., Coval and Moskowitz, 1999), we calculate the distance (*dist*) between institution *h* and facility *i* as follows:

$$dist_{hi} = r \times \arccos \left\{ \begin{array}{l} \cos(lat_h)\cos(lon_h)\cos(lat_i)\cos(lon_i) \\ + \cos(lat_h)\sin(lon_h)\cos(lat_i)\sin(lon_i) + \sin(lat_h)\sin(lat_i) \end{array} \right\}, \quad (1)$$

where $dist_{hi}$ is the distance in statute miles, *r* denotes the radius of the earth (approximately 3,963 statute miles), and *lat* and *lon* are the latitude and longitude (measured in radians) of institution and facility locations, respectively.

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[4] Another popular proxy for CSR performance is the KLD rating. The KLD rating is a cumulative score based on KLD's assessment of a firm's CSR performance in seven broad categories: community relations, corporate governance, employee relations, diversity, the environment, human rights, and product quality and safety. KLD considers emissions of toxic chemicals in TRI reports when rating a firm's environmental performance. In untabulated analysis, we aggregate facility-level toxic release data to firm-level, and study the correlation between the KLD rating and our toxic release measures. We find that the overall KLD rating is significantly and negatively correlated with the natural logarithm of the amount of total, on-site, and off-site toxic release. The correlation coefficient is the highest for on-site toxic release (coefficient=-0.072), followed by total release (coefficient=-0.058) and off-site release (coefficient=-0.017). The KLD environmental rating is also significantly and negatively correlated with the natural logarithm of the amount of total, on-site, and off-site toxic release. The correlation coefficient is the highest for on-site toxic release (coefficient=-0.199), followed by total release (coefficient=-0.172) and off-site release (coefficient=-0.063).

2.2.Sample description

Our sample contains 234 unique four-digit Standard Industrial Classification (SIC) codes. The top five industries are 3312 (Steel Works, Blast Furnaces, and Rolling Mills), 2911 (Petroleum Refining), 3714 (Motor Vehicle Parts and Accessories), 3490 (Miscellaneous Fabricated Metal Products), and 2011 (Meat Packing Plants), which make up 15.8% of the total facility-year observations. The sample exincludes utilities. Throughout the sample period, an average firm has five facilities with 336 employees per facility. An average firm generates $4.7 billion in net sales in 2010 and has data coverage in Compustat for about 26 years. The mean total institutional ownership is 55.6%, which is consistent with the findings in existing studies (e.g., Hartzell and Starks, 2003). The mean ownership of institutions located within 150 miles of a facility is 2.9%, while the mean ownership of dedicated institutions located within 150 miles of a facility is 0.6%. Our local institutional ownership variables are in line with the existing literature. For example, Ayer et al. (2011) report a mean local monitoring institutional ownership of 1.4%. Table 1 provides summary statistics of the sample.

3. Total amount of toxic release and local institutional ownership

3.1.Impact of local institutional ownership on toxic release

3.1.1.Baseline model

We estimate the following baseline model to analyze the relation between CSR activities and shareholder interests and preferences:

$$TR_{ijt} = \gamma localown_{ij,t-1} + \beta_1 facility\_size_{ij,t-1} + \beta_2 firm\_size_{j,t-1} + \beta_3 firm\_age_{j,t-1} + \beta_4 slack_{j,t-1} + \beta_5 leverage_{j,t-1} + \beta_6 R\&D/sales_{j,t-1} + \beta_7 AD/sales_{j,t-1} + \beta_8 HHI_{k,t-1} + d_j + d_t + \varepsilon_{ijt}, \quad (2)$$

where i indexes facility, j indexes firm, k indexes industry, and t indexes year. Firm and year dummies are d_j and d_t , respectively. ε_{ijt} denotes the disturbance term. Each specification is estimated using the ordinary least squares (OLS) method with robust standard errors accounting for heteroskedasticity and facility clustering. *TR* is the natural logarithm of the total amount of total, on-site, or off-site release of toxic chemicals at the facility level, which is the aggregated amount in pounds of all chemicals released to air, water, and land by a facility in a given year. (We use "the total amount," "the amount," and "the actual amount" interchangeably in the paper. These descriptions are distinct from "the predicted amount" and "the residual amount," which are additional measures of toxic release that we introduce in Section 4.) Our main variable of interest (*localown*) is the percent of equity ownership by institutions located within 150 miles from a facility.[5]

We use the natural logarithm of the number of employees at a facility to measure facility size (*facility_size*); larger facilities produce more and are therefore expected to release a larger quantity of toxic chemicals. We use the natural logarithm of firm sales to measure firm size (*firm_size*); larger firms may have the necessary resources and a greater incentive to invest in pollution prevention programs, given the greater amount of pollution (Arora and Cason, 1995). We control for firm age (*firm_age*), which is the natural logarithm of the number of years since a firm was first included in the Compustat database. Older firms likely have older equipment, which is generally less efficient and emits more pollution. Hong, Kubik, and Scheinkman (2012) find that firms with greater financial slack do more corporate goodness. Therefore, we control for *slack* and *leverage* to capture the extent of financial slack. *slack* is the ratio of cash plus short-term investments to total assets. *leverage* is the ratio of long term debt plus current debt in liabilities to total assets. Firms with a higher level of research and development (R&D) spending are more innovative and are likely more capable of investing in processes that reduce pollution (McWilliams and Siegel, 2000). Servaes and Tamayo (2013) find that advertising intensity

[5] For robustness, we calculate alternative measures of toxic release and local institutions later in the paper.

enhances consumer awareness of CSR activities and ultimately the value of CSR. Therefore, we also control for R&D and advertising expenditures. As firms are not required to disclose R&D and advertising expenditures if they are immaterial, we follow the literature and set missing values to zero (Himmelberg, Hubbard, and Palia, 1999; Servaes and Tamayo, 2013). Although its impact on the amount of toxic release is unclear, we control for competition intensity. One school of thought views CSR activities as a product differentiating strategy and predicts that firms have greater incentives to differentiate their products in competitive environments (Arora and Cason, 1995; McWilliams and Siegel, 2000). Another school of thought argues that firms pursue CSR activities for altruistic reasons and/or for the private benefit of corporate insiders (Friedman, 1970; Barnea and Rubin, 2010). This school of thought predicts a negative relation between CSR activities and competition intensity. We use the Herfindahl-Hirschman index (*HHI*) to measure competition intensity in a three-digit SIC code industry (Giroud and Mueller, 2010). We provide variable definitions and descriptions in Appendix A.

3.1.2.Regression results

Table 2 presents the regression results of the baseline model. As column (1) shows, the ownership of institutions that are located within 150 miles of a facility has a significantly negative impact on the total amount of toxic release of the facility.[6] As the dependent variable (the amount of toxic release) is in log form and local institutional ownership is measured in decimals, the estimated coefficient of *localown* suggests that an increase of one percentage point

[6] For further robustness, we also run our baseline regression using a dummy variable, which takes the value of one if there is an institution located within 150 miles of the facility. Our results hold using this alternative specification. Specifically, the coefficient estimate of the dummy variable is -0.184 with a *p*-value of 0.086 in the regression of total toxic release, -0.252 with a *p*-value of 0.023 in the regression of on-site toxic release, and insignificant in the regression of off-site toxic release. In addition, we run our baseline regression using the number of institutions located within 150 miles of the facility. Our results remain qualitatively the same: the abatement effect is statistically significant in total and on-site toxic release, but insignificant in off-site toxic release. All untabulated results are available upon request.

in local institutional ownership leads to a reduction of 2.950% in the total amount of toxic chemicals released into the environment. As some facilities send toxic chemicals off-site to be treated at specialized waste management facilities, we discriminate between on-site and off-site toxic release. The idea is that if geographic proximity indeed affords local institutions information and monitoring advantages associated with the hazardous waste management of the facility, then those advantages are lost if hazardous waste is managed off-site. In other words, the off-site sample constitutes a unique control group for the treatment group, where institutions are located close to the site of hazardous waste management. As columns (2) and (3) show, local institutional ownership is only significantly and negatively related to on-site toxic release, but has no effect on off-site toxic release. These results confirm the prevailing view that distance affects information and monitoring costs and support our choice of distance as a proxy for the intensity of shareholder interests and preferences.

The control variables generally take on the expected signs. For example, we find that large facilities emit a larger quantity of toxic chemicals. Consistent with the notion that CSR activities are more beneficial to firms with high consumer awareness (Arora and Cason, 1995; Servaes and Tamayo, 2013), we find that firms with a higher level of advertising spending are associated with a lower quantity of toxic release. When the control variables take on the opposite signs, the results are still instructive. For example, we expect older firms to release a greater amount of toxic chemicals because they tend to have older and less efficient equipment. We find that firms, regardless of their age, emit similar amounts of total and on-site toxic release, but older firms are associated with a smaller amount of off-site toxic release. This suggests that younger firms may lack the necessary expertise and resources to manage hazardous waste themselves. Our results hold if we replace firm fixed effects with industry fixed effects either at the level of three-digit SIC codes or at the level of two-digit SIC codes.

In summary, Table 2 provides strong initial evidence that there is a close link between CSR activities and shareholder interests and preferences.

3.2.Impact of local institutional ownership on toxic release at various distances

To provide further evidence that geographic proximity facilitates shareholders to exert influence, we re-run the baseline regression using the ownership of institutions that are located within 50 miles, 100 miles, and 250 miles of a facility. Table 3 presents the regression results. When using these alternative definitions of local institutions we again find that local institutional ownership has a significantly negative impact on the total amount of toxic release of local facilities. Consistent with Table 2, the negative impact is driven only by on-site toxic release. Indeed, the coefficient estimate of local institutional ownership is larger and statistically more significant in the regressions of on-site toxic release than in the regressions of total toxic release for each alternative definition of local institutions and is insignificant in all the regressions of off-site toxic release for each alternative definition of local institutions.

The most important takeaway is that when Tables 2 and 3 are viewed together, an apparent monotonic pattern emerges. As institutions are located farther away from the polluting facility, the negative impact of institutional ownership on the amount of toxic release of the facility decreases monotonically both in terms of economic magnitude and statistical significance. In untabulated analysis, we perform the Wald test to compare whether the estimated coefficients of local institutional ownership measured at various distances are significantly different across the regressions in Tables 2 and 3. We find significant differences except for *localown_50* versus *localown_100*. Specifically, for the regression of total toxic release, the coefficient estimate of *localown_100* is significantly different from that of *localown_150* with a *p*-value of 0.005, while the coefficient estimate of *localown_150* is significantly different from that of *localown_250* with a *p*-value of 0.009.

To summarize, Tables 2 and 3 provide strong evidence that the influence of institutional ownership on the amount of toxic release weakens as the distance between institutions and the polluting facility grows.

3.3.Impact of local institutional ownership on toxic release by institution type

If firms adopt environmental policies in response to shareholder interests and preferences, the amount of toxic release may also vary systematically by institution type. Existing literature shows that different types of shareholders exhibit different preferences for firm-specific characteristics such as dividends (Becker et al., 2011), earnings timing (Bushee, 2001), and governance arrangements (Brickley et al., 1988), which in turn affect corporate policies.

Following Bushee (2001), we classify local institutions into "dedicated" and "transient" and re-run the baseline model replacing local institutional ownership with the ownership of local dedicated institutions (*localown_DED*) and local transient institutions (*localown_TRA*).[7] Local institutions are still defined as those located within 150 miles of a facility. Columns (1) to (3) of Table 4 present the results of the regressions. Two patterns are worth noting. First, consistent with our expectation, only the ownership of local dedicated institutions has a significantly negative impact on the amount of toxic release. Although the ownership of local transient

[7] We obtain institution classification data from http://acct3.wharton.upenn.edu/faculty/bushee/IIvars.html, where institutions are classified based on investment behaviors using factor analysis and cluster analysis (Bushee, 2001). Dedicated institutions are characterized by large average investments in portfolio firms and extremely low turnover. Transient institutions are characterized by high portfolio turnover and small holdings in numerous firms.

institutions enters the regression with a negative sign, its coefficient is insignificant. Second, the negative impact of local dedicated institutions is driven only by on-site toxic release. Overall, the results are consistent with the idea that dedicated institutions are long-term relationship investors who have a greater incentive than transient institutions to monitor and gather information.

For additional evidence, we classify local institutions into independent and grey based on Brickley et al. (1988). Specifically, we classify mutual funds and independent investment advisors as independent institutions (*localown_INDEP*), and bank trusts, insurance companies, and other institutions as grey institutions (*localown_GREY*). Brickley et al. (1988) argue that grey institutions tend to have business ties with a firm and are thus less effective monitors of the management. They and subsequent researchers (e.g., Chen et al., 2007; Ayers et al., 2011) find supporting evidence for the argument. Columns (4) to (6) of Table 4 present the regression results. Consistent with the notion that independent institutions are more effective monitors, we find that only the ownership of local independent institutions has a significantly negative impact on the amount of toxic release. Again, the negative impact is driven only by on-site toxic release. Additionally, *localown_GREY* enters the off-site regression with a positive and marginally significant sign, which is again consistent with idea that independent institutions play a more effective monitoring role than grey institutions. The different results from independent and grey institutions are particularly interesting when viewed collectively with Hong and Kacperczyk (2009). Hong and Kacperczyk argue that institutions that are subject to social-norm pressures invest less in sin stocks (i.e., stocks of alcohol, tobacco, and gaming companies). They classify norm-constrained institutions in the same way as we classify grey institutions and classify unconstrained institutions in the same way as we classify independent institutions. Consistent with their argument, Hong and Kacperczyk find that shareholdings in sin stocks are disproportionally smaller only for norm-constrained institutions and not for institutions that are less sensitive to social-norm pressures. Importantly, they find that sin stocks outperform comparable stocks. Therefore, when our results are viewed with Hong and Kacperczyk's, the prima facie evidence suggests that independent institutions may care about pollution abatement for economic reasons. (We further investigate this conjecture in Section 5.)

To summarize, we find that the amount of toxic release varies with institution type in systematic ways that are consistent with the view that firms adopt pollution abatement policies in the interests of shareholders and other stakeholders.

3.4.Additional robustness checks

3.4.1.Alternative measures of toxic release

While our measure of the amount of toxic release is in line with the existing literature, we also compute two alternative measures for robustness. As the toxicity of each chemical varies, we follow King and Lenox (2000) and calculate the weighted sum of toxic release by weighing each chemical by the inverse of its Reportable Quantity (RQ). The EPA developed substance-specific RQ, requiring immediate reporting to authorities should a listed substance be released into the environment in an amount beyond its RQ. For example, for highly toxic chemicals like arsenic, the RQ is one pound, while relatively benign chemicals like methanol have a RQ of 5,000 pounds.[8] Therefore, RQ proxies for the toxicity or the environmental harm of each chemical. Following Hart and Ahuja (1996), our second measure is the ratio of annual facility emission of toxic chemicals in pounds over the firm's revenue in millions of dollars. As Table 5 shows, our results hold when we use these alternative measures of toxic release.

[8] We collect the RQ data for each chemical from the website of the U.S. Department of Energy (http://homer.ornl.gov/rq/index.cfm).

3.4.2.Causality checks

Our main result is that local institutional ownership is negatively associated with the amount of toxic chemicals released by local facilities. We interpret the result as evidence that shareholders affect corporate pollution abatement policies. An alternative explanation for our finding is that facility pollution practices affect shareholders' investment decisions. For example, institutional investors may systematically filter out polluting facilities when forming investment portfolios.[9] However, this concern should be less severe for our study than if firm-level data had been used, because investment decisions are made at a macro level (e.g., at the sector or firm level) as opposed to a facility level. Assuming that heterogeneities in pollution release exist at the facility level within a firm, our model specification that controls for firm fixed effects alleviates this causality concern. (The average firm in our sample has five facilities with a maximum of 72.) Indeed, we performed a Hausman test, which fails to reject the null hypothesis that our local institutional variable is uncorrelated with the errors (*p*-value=0.120). Nonetheless, for robustness, we conduct a change-on-change analysis and a generalized method of moments (GMM) dynamic panel estimation analysis in our effort to establish a causal link between local institutional ownership and the amount of toxic release.

The change-on-change analysis is a popular test that empiricists use to study causal relations (see, e.g., Aggarwal et al., 2011; Chhaochharia, Kumar, and Niessen-Ruenzi, 2012). Specifically in our case, if shareholder interests and preferences indeed shape facility pollution abatement policies, we should find that changes in local institutional ownership lead to changes in the amount of toxic release by facilities, whereas the reverse causation is absent (i.e., changes

[9] We believe that it is still meaningful if shareholders make investment decisions based on facility pollution practices even if they do not directly influence the practices, because shareholders' demand for a company's stock impacts firms' cost of capital, which should ultimately impact firm behavior (El Ghoul, Guedhami, Kwok, and Mishra, 2011).

in facility toxic release do not cause changes in local institutional ownership). To provide greater depth for our results, we examine the effects of positive changes and negative changes separately, as directional movements in pollution abatement practices are likely asymmetrical. Pollution abatement activities are typically expensive, requiring large initial physical and human capital investment. Thus, once a firm makes the institutional commitment to adopt better environmental practices, it can be costly for the firm to reverse course.

Panel A of Table 6 reports the regression results of changes in the amount of toxic release on lagged changes in local institutional ownership. Similar to Aggarwal et al. (2011) and Chhaochharia et al. (2012), we include lagged levels of toxic release to account for the mechanical relation that existing levels of toxic release affect the extent of future changes. Consistent with the expectation, positive changes in local institutional ownership from year t-2 to year t-1 have a significantly negative impact on changes in the amount of toxic release from year t-1 to year t. Conforming with our earlier findings, the negative impact is driven only by on-site toxic release. Consistent with the idea that changes in pollution abatement practices are asymmetrical, no significant relation exists between negative changes in local institutional ownership in year t-1 and changes in the amount of toxic release in year t. Panel B of Table 6 reports the regression results of changes in local institutional ownership on lagged changes in the amount of toxic release. We find no evidence that changes in the amount of toxic release from year t-2 to year t-1 lead to changes in local institutional ownership from year t-1 to year t. Coefficient estimates of all lagged change variables for toxic release are nil, with all estimates except one being statistically insignificant.

To summarize, the change-on-change test suggests that our findings are not due to reverse causality. Specifically, the results are consistent with the interpretation that local institutional investors affect the amount of toxic chemicals released by local facilities, but not with the interpretation that local institutional investors adjust their portfolios in anticipation of future changes in facility pollution abatement practices.

As another causality check, we use the GMM dynamic panel estimation method, which is robust to endogeneity problems due to reverse causality, simultaneity, and unobserved heterogeneity (Wintoki, Linck, and Netter, 2012). We report the results in Table 7 columns (1)-(3). Results from the GMM analysis confirm our earlier findings. The coefficient estimate of *localown* is significantly negative in the sample of *total* (coefficient=-1.486, *p*-value=0.053) and *on-site* (coefficient=-2.013, *p*-value=0.021) toxic release, but insignificant in the sample of *off-site* (coefficient=0.027) toxic release. Table 7 also reports the results of specification tests for the validity of the GMM estimation procedure. If the assumptions of the specification are valid, then residuals in the first differences (AR(1)) should be correlated, but uncorrelated in the second differences (AR(2)). Results of these tests confirm that these are indeed the case. The Hansen test for over-identifying restrictions (*J*-statistic) shows that under the null hypothesis of instrument validity, we cannot reject that our GMM instruments are valid. As GMM accounts for time-invariant firm heterogeneities, we control for year- and industry- fixed effects in the GMM regressions.

3.4.3.Control for location and regulation effects

The decisions of firms, facilities, and investors in choosing their physical locations are not random. For example, institutional investors tend to cluster in large cities, while firms may systematically prefer to locate polluting plants in smaller cities and rural areas or in states where environmental regulation is lax. In this section, we perform a series of tests to address this potential concern that arises from omitted variables. To conserve space, we only report results from total release because the results from on-site and off-site release after controlling for location and regulation effects give us conclusions similar to our previous results. Namely, local institutional ownership significantly reduces the amount of toxic release and the abatement effect is driven by on-site release.

In column 1 of Table 8, we report the regression results when we add Metropolitan Statistical Area (MSA) fixed effects to the baseline model. An MSA is a geographical region with a relatively high population density at its core and close economic ties throughout the area. MSAs are defined by the U.S. Office of Management and Budget. We obtain the MSA data from the 2003 U.S. Census. In that year, America had 370 MSAs; in our sample, the facilities are dispersed over 327 MSAs. Our results hold in this robustness check.

In column 2 of Table 8, we add to our baseline model the natural logarithm of the distance in miles between a facility and the firm's headquarters (*facility_HQ_distance*). The rationale for including this variable is twofold. First, arguments can be made that facilities near corporate headquarters pollute less because headquarters tend to be located in large cities, while facilities are located in rural areas where pollution regulation is lax (Aarland, Davis, Henderson, and Ono, 2007). Second, firms may have a greater incentive to minimize bad publicity and promote the image of good citizenship in the location of their headquarters (Kolko and Neumark 2010). Our results hold after we control for the distance between a facility and the firm's headquarters. *Facility_HQ_distance* enters the regression with a significantly negative sign, suggesting that the further away from headquarters a facility is located, the lower the quantity of pollution released by that facility into the environment. Assuming that pollution amount correlates with production level,[10] this result is consistent with the idea that firms may want to locate their headquarters close to production activities to minimize communication and coordination costs (Henderson and Ono, 2008).

As environmental regulation varies considerably across regions, we conduct several robustness checks to verify that our results are not driven by heterogeneities in environmental regulation. As our first attempt, we add to our baseline model a proxy for the stringency of a state's environmental regulation (*REG_stringency*). Following Meyer (1995) and King and Lenox (2001), we construct this measure as the inverse of the natural logarithm of the total amount of toxic release divided by the total number of employees in four main polluting industries: chemicals, petroleum, pulp and paper, and materials processing. As column 3 of Table 8 shows, our results hold in this robustness check. Further, the coefficient of *REG_stringency* is significantly negative, which is consistent with the notion that more stringent environmental regulation reduces pollution. In another attempt, we include in our baseline model both MSA and state fixed effects. As column 4 of Table 8 shows, our results also hold in this robustness check. Moreover, we re-run our baseline model excluding facilities located in California and New York as their environmental regulation is quite different from other states.[11] Our results (untabulated to conserve space) also hold under this alternative specification.

Finally, we include in our baseline model the distance between a facility and a firm's headquarters as well as MSA and state FE. As column (5) of Table 8 shows, our results remain qualitatively the same.

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[10] The result of a simple correlation test is consistent with this conjecture: the correlation coefficient is -0.098 with 1% significance between *facility_HQ_distance* and facility size (proxied with the natural logarithm of the number of employees at the facility).

[11] http://www.stpub.com/environmental-state-differences-summaries-and-checklists-online.

3.4.4. Control for managerial private benefits

CSR opponents principally argue that corporate insiders undertake CSR activities for their private benefit instead of the interests of shareholders. Supporting this argument, Jiao (2010) and Barnea and Rubin (2010) find a negative relation between insider ownership and the KLD rating. As we described earlier, the KLD rating is a firm-level score of corporate social performance. In light of this argument, we perform two additional robustness checks to examine whether our results hold after controlling for the possibility that insiders use CSR to extract private benefits. As explained in Section 3.4.3, we only report in Table 8 regression results from total release for a more streamlined presentation of the robustness check results.

In our first test, we obtain CEO ownership data from Execucomp and add the percent of CEO ownership (*CEO ownership*) to our baseline model. Our results hold after controlling for this additional variable. *CEO ownership* is consistently positive, albeit without any significance, in total, on-site and off-site regressions. In our second test (results not tabulated to conserve space), we use the managerial entrenchment index proposed by Bebchuk, Cohen, and Ferrell (2009) as an alternative measure for potential managerial misappropriation. Our results hold after controlling for this variable. Specifically, the coefficient estimate of *localown* is -2.870 with 1% significance in the regression of total release, -2.794 with 1% significance in the regression of on-site release, and insignificant in the regression of off-site release. The entrenchment index is negative and insignificant in all regressions.

3.4.5. Compare institutional ownership near facilities to other institutional ownership measures

In columns (7) and (8) of Table 8, we analyze pollution abatement effects of alternative measures of institutional ownership. The idea is to provide further evidence for our main variable of interest – institutional ownership near facilities (*localown*) – through the lens of compare and contrast. As explained in Section 3.4.3, we only report regression results from total release to conserve space.

Column (7) reports the regression results when we re-run the baseline model replacing *localown* with a firm's total institutional ownership (*totalown*). The coefficient estimate of *totalown* is insignificant in total, on-site, and off-site regressions, underscoring again the importance of local monitoring.

In column (8), we add to our baseline model institutional ownership near corporate headquarters along with MSA and state FE. Although local institutions have information and monitoring advantages in pressuring local facilities to reduce pollution, the corporate headquarters have the ultimate authority to allocate the necessary resources to implement pollution abatement policies. Therefore, it is instructive to compare and contrast the local monitoring effect and the headquarters effect on pollution abatement. We obtain headquarters data for the period of 1994-2006 from Compact Disclosure and for the period of 2007-2010 from the CRSP-Compustat Merged Database. We measure institutional ownership near corporate headquarters in a similar manner to institutional ownership near the emitting facility (*localown*), which is the ownership of institutions that are located within 150 miles of the corporate headquarters (*localown_HQ*).

As column (8) shows, *localown* has a significantly negative impact on the amount of toxic release, while *localown_HQ* does not. In untabulated analysis, we exclude the observations in which facilities are located within 150 miles of the headquarters to better discriminate between the headquarters effect and the local monitoring effect. Under this specification, the coefficient estimates of both *localown* and *localown_HQ* become larger and more significant, suggesting that this specification does a better job of separating the local monitoring effect from the headquarters effect. Namely, once the facilities located near corporate headquarters are excluded from estimation, the headquarters effect is no longer absorbed by the local monitoring effect. For example, the coefficient estimate of *localown* is -4.060 with 1% significance, while that of *localown_HQ* is -2.452 with 1% significance in the regression of total release. Notably, the abatement effect of *localown* is larger than that of *localown_HQ*.

4. Residual amount of toxic release and local institutional ownership

The evidence that we have produced so far relates to the amount of toxic release that is a function of the nature of a firm's business and its efforts in reducing pollution. Therefore, to better capture the effect of local institutions on firms' efforts to reduce pollution, we estimate the residual amount of toxic release, which is the difference between the total (i.e., actual) amount of toxic release and the predicted amount of toxic release. To get the residual amount of total toxic release of each facility, we follow the King and Lenox (2002) approach and estimate the relation between facility size and the amount of total toxic release for each three-digit SIC industry in year *t*:

$$TR_{it} = \alpha_{jt} + \beta_{1jt} facility\_size_{i,t-1} + \beta_{2jt}(facility\_size_{i,t-1})^2 + \varepsilon_{it}\,, \tag{3}$$

where *TR* is the natural logarithm of the amount of total toxic release at facility *i* in year *t*, *facility_size* is the natural logarithm of the number of employees at facility *i*, α_{jt}, β_{1jt}, and β_{2jt} are the estimated coefficients for each three-digit SIC industry *j* in year *t*, and ε_{it} is the disturbance term. For model stability, we require each regression to have at least 20 observations, which reduces the sample size from 42,658 to 34,727 facility-year observations. We then use the estimated coefficients of $\hat{\alpha}_{jt}$, $\hat{\beta}_{1jt}$, and $\hat{\beta}_{2jt}$ from Eq. 3 to predict the amount of total toxic release of each facility given its size, industry, and year. Last, we subtract the predicted amount of total toxic release from the actual amount to arrive at the residual amount of total toxic release of each facility. We repeat the same process to get the residual amount of on-site and off-site toxic release.

Columns (1) to (3) in Panel A of Table 9 report the results of the baseline regression when we use the natural logarithm of the residual amount of toxic release as the dependent variable. Consistent with our earlier findings, local institutional ownership has a significantly negative effect on the residual amount of total toxic release. Further, the negative effect is driven only by on-site release. Therefore, using an alternative measure of toxic release that better captures corporate pollution abatement efforts, we again find strong evidence that shareholders influence CSR policies.

Columns (4) to (6) report the results of the baseline regression when we use the natural logarithm of the predicted amount of toxic release as the dependent variable. We perform these regression tests for verification purposes. Intuitively, local institutions cannot influence the amount of toxic release of a facility by affecting the nature of the production (e.g., change the facility from a paper and pulp producer to a service provider), but they can influence the amount of toxic release of the facility by affecting its pollution abatement efforts. Therefore, if we find that local institutional ownership has a stronger impact on the residual amount of toxic release than on the predicted amount, it is evidence that our prediction model does a reasonable job in estimating the predetermined amount of toxic release given the nature of the production of the facility. Consistent with our expectation, the coefficient of local institutional ownership is only marginally significant in the regression of the predicted amount of total release and is insignificant in the regressions of on-site and off-site release. Additionally, operating variables such as *firm_age*, *slack*, and *HHI*, which have little explanatory power for the actual amount of toxic release in Table 2, are significantly related to the predicted amount of toxic release, which also lends credence to our prediction model.

It is reasonable to expect that institutions exert efforts to reduce toxic release in anticipation of firms' efforts. Therefore, we separate the sample into those associated with positive residual release and those associated with negative residual release. Results are reported in Panel B of Table 9. Consistent with the expectation, we find that local institutions play a stronger role in reducing pollution when the actual amount of toxic release exceeds the predicted amount (i.e., when facilities are "dirtier").

While we find the results in Table 9 instructive, several caveats are in order. First, although we believe that our model does a reasonable job separating abnormal levels from normal levels of toxic release, we acknowledge that our model is limited by data availability at the facility level. For example, we do not have data on the actual level of production of each facility. We attempt to address this issue by proxying facility production using the number of employees at each facility, a practice that is consistent with the literature (e.g., King and Lenox, 2002). Additionally, we lose nearly 20% of the observations during the estimation of the prediction model.

5. Toxic release, local institutional ownership, and firm performance

Our primary research question is how responsive CSR activities are to shareholder interests and preferences. As a final step toward providing a portfolio of evidence for our research question, we study the economic incentives that local institutions have to influence corporate pollution abatement policies. Research on the relation between CSR and firm performance started in the early 1970s (Margolis and Walsh, 2003) and has grown exponentially in recent years. While some researchers find a positive relation, others report a negative one.[12] We do not wish to resolve this debate here. Our goal is to provide additional evidence for our primary research question, namely whether shareholders influence CSR decisions. Therefore, in this section, we investigate whether there is any cohesion between shareholders' influence on CSR and the relation between CSR and firm performance. In other words, is there any economic gain for local institutions to pressure facilities to reduce pollution?

5.1.Research design and related studies

Although the literature on the relation between CSR and firm performance is vast, few studies analyze the value implications of CSR conditional on the activist pressure by institutional investors. Notable exceptions are Carleton, Nelson, and Weisbach (1998) and Teoh, Welch, and Wazzan (1999). Carleton et al. find that most firms add women or minorities to their boards after being targeted by TIAA-CREF for board diversity. They find significantly negative abnormal returns surrounding board diversity targetings. Teoh et al. examine the most significant shareholder boycott until then – the boycott of South Africa's apartheid regime. They find that, despite publicity surrounding the boycott, shareholder pressure had no impact on the valuation of banks and corporations with South African operations because corporate involvement in South Africa was small to begin with. However, they find some weak evidence that institutional shareholdings in firms with South African investments increased when those firms divested.

[12] For a survey of this literature, please refer to Orlitzky, Schmidt, and Rynes (2003), Margolis, Elfenbein, and Walsh (2007), Van Beurden and Gössling (2008), Renneboog, Horst, and Zhang (2008), and Kitzmueller and Shimshack (2012). For a discussion of the challenges encountered by empirical researchers regarding the relation between CSR and firm performance see Bénabou and Tirole (2010).

To investigate the economic incentives of institutional investors in pressuring local facilities to reduce pollution, we take a two-stage approach. First, we analyze the valuation effect of the interactive term between local institutional ownership and the amount of toxic release of the nearby facility. Next, we investigate whether the interactive effect is stronger for those firms who likely benefit more from CSR and for those types of institutions who have a greater economic incentive to pressure firms to engage in CSR.

Our second stage of analysis is motivated by recent developments in the CSR literature. Specifically, Servaes and Tamayo (2013) argue that the valuation effect of CSR critically depends on whether firms can effectively influence the behavior of their key stakeholders. As customers decide the price and demand for a firm's products, a firm's ability to influence the behavior of its customers should be an important driver for the valuation impact of CSR. Consistent with this argument, Servaes and Tamayo (2013) find that CSR by itself does not affect firm value, as proxied by Tobin's *Q*. However, when interacted with the level of a firm's consumer awareness, as proxied by advertising spending, CSR has a significantly positive impact on Tobin's *Q*. Eccles, Ioannou, and Serafeim (2013) find similar evidence. Therefore, we investigate whether the economic incentive of institutional investors in pressuring local facilities to reduce pollution is stronger for those firms with a higher level of consumer awareness, as proxied by advertising spending.

In another analysis, we test whether the economic incentive of pressuring local facilities to reduce pollution is stronger for certain types of institutional investors. Specifically, "CSR is about taking a *long-term perspective* to maximizing (intertemporal) profits" (Bénabou and Tirole, 2010, pg. 10). This predicts that long-term investors should value CSR more and have a greater incentive to pressure firms to engage in CSR. Consistent with this argument, Eccles et al.

(2013) find that high sustainability firms, defined as those that voluntarily adopted a large number of sustainability policies, have an investor base with a larger proportion of long-term investors. They use Bushee (2001)'s definition of dedicated institutions to measure long-term investors. Therefore, we analyze whether the economic incentive in pressuring local facilities to reduce pollution is stronger for long-term (or dedicated) institutional investors than for short-term (or transient) institutional investors. As discussed in Section 3.3, Hong and Kacperczyk (2009) find that investment decisions by mutual funds and independent advisors, defined traditionally in the literature and in our study as independent institutions, are driven by economic fundamentals rather than social norms. Therefore, we also test whether the economic incentive in pressuring local facilities to reduce pollution is stronger for independent institutions than for grey institutions.

For our first-stage analysis, we employ two specifications: The first one uses industry fixed effects, while the second one uses firm fixed effects. It is well established that pollution abatement practices vary widely across industries due to a variety of industry-specific factors. For example, some industries are inherently "dirtier" than others, some are at the declining versus growing stage of the industry life cycle, and some face more intensive environmental regulation and disclosure standards. A regression model with the inclusion of industry fixed effects controls for any permanent cross-sectional industry differences that may drive a firm's pollution abatement policies. The inclusion of firm fixed effects has the advantage of absorbing time-invariant industry differences while simultaneously controlling for any latent firm characteristics that potentially influence corporate environmental policies. However, these benefits also come at a cost. Specifically, data may lack sufficient time series variation within firms to allow the model to detect any significant relation. Prior studies on the CSR-performance relation frequently focus on a single industry and most do not control for firm fixed effects (Margolis et al., 2007; Servaes and Tamayo, 2013). We report estimation results from both industry and firm fixed effects for our first-stage analysis so that our results can be more easily compared to prior studies. But we only report firm fixed effects for our second-stage analysis because our main result (the interactive effect of toxic release and local institutional ownership) remains qualitatively the same regardless of the specification used. Additionally, recent developments in practice and in the literature suggest that it may be important to control for unobserved firm heterogeneities.[13]

5.2.Regression model

To address our research questions, we aggregate facility-level toxic release data to firm-level and estimate the relation between firm performance, firm toxic release, and local institutional ownership in the following OLS framework:

$$Tobin's\ Q_{it} = \beta_1 clean_{it} * localown_{it} + \beta_2 clean_{it} + \beta_3 localown_{it} + X + \varepsilon_i, \quad (4)$$

To get firm-level measures of toxic release and local institutional ownership, we weigh the facility-level data by the ratio of the number of employees of each facility over the total number of employees of the firm and take the weighted sum. We use Tobin's *Q* to measure long-run firm performance because *Q* is the present value of all future cash flows over the replacement cost of assets. Pollution abatement initiatives can require large initial investment and pay off only in the long run. Therefore, for the purpose of our study, *Q* is a better measure of firm performance than

[13] Anecdotal evidence shows that some firms engage in CSR to "green wash" themselves, while others make profits to engage in CSR (*see, e.g.,* BP's Long History of Greenwashing and Accidents, by Gina-Marie Cheeseman, May 18, 2010, http://www.triplepundit.com/2010/05/bp-has-a-long-history-of-green washing-and-accidents/; Patagonia's Founder Is America's Most Unlikely Business Guru, by Seth Stevenson, April 26, 2012, WSJ Magazine, http://online.wsj.com/news/articles/SB10001424052702303513404577352221465986612). Eccles et al. (2013) show that high sustainability firms have distinct organizational processes compared to low sustainability firms of otherwise comparable characteristics. These latent firm-level heterogeneities likely impact the CSR-performance relation and are best modeled in a framework of firm- rather than industry- level fixed effects.

flow measures such as ROA. Another advantage of using *Q* is that it measures the contribution of a firm's intangible assets (e.g., firm reputation and customer goodwill) to its market value. The disadvantage of *Q* is that we need to assume that financial markets are efficient and a firm's market value is an unbiased estimate of the present value of all its future cash flows.

Clean is the residual release measure from Section 4 (see columns (1)-(3) in Panel A of Table 9 for regression results between residual release and local institutional ownership) multiplied by negative one. We multiply residual release by negative one for easy interpretation of regression results. Specifically, this way, *clean* and *localown* have the same directional impact on *Q*. Further, *clean* provides the intuitive interpretation of whether having cleaner facilities (i.e., facilities emitting less pollution) increases firm value. We use residual release instead of total release because the former directly models firm pollution abatement efforts and hence is a sharper measure of corporate pollution abatement policies. Supporting this idea, we find in Table 9 that *localown* significantly reduces residual release, but has little effect on predicted release. Recall, total release is the sum of predicted release and residual release. We obtain predicted release by modeling facility pollution amount as a function of facility size, industry, and year. Therefore, total release is driven by both the nature of a firm's business (e.g., a power plant versus a software company) and by corporate pollution abatement policies (e.g., whether a power plant installs new carbon capture and sequestration technology to reduce carbon dioxide emissions). A positive coefficient of *clean* (β_2) would suggest that a firm's pollution abatement policies increase firm value and are in the best interest of shareholders.

Our primary variable of interest is *clean***localown*. A positive coefficient (β_1) would suggest that there is cohesion between shareholders' influence on CSR activities and the impact of such influence on firm performance. In other words, local institutions do not act purely for altruistic reasons but also for their own economic interests. To get the unbiased estimate of the primary effects of *clean* and *localown*, we demean the two variables in all regressions used to estimate Eq. 4 (Aiken and West, 1991). *X* is a vector of firm characteristics that the existing literature finds to predict *Q*, including firm size, firm age, profitability (measured by return on assets (ROA)), growth opportunities (measured by sales growth and R&D spending), leverage, and stock return volatility.

5.3. Results

5.3.1. Economic incentives of local institutions to influence corporate pollution policies

Panel A of Table 10 reports the estimation results of Eq. 4. In columns (1)-(3), we control for industry fixed effects so that our results are comparable to prior studies (see, e.g., Margolis et al., 2007; Servaes and Tamayo, 2013). In columns (4)-(5), we control for firm fixed effects to address any time-invariant unobservable industry or firm factors that may drive both valuation and corporate pollution abatement policies. The coefficient estimate of *clean***localown* is significantly positive in both the total and on-site toxic release regressions regardless of whether we control for industry or firm fixed effects, suggesting that when local institutional ownership is high, corporate pollution abatement policies enhance firm value. Interestingly, *clean***localown* is insignificant in the off-site toxic release regressions, which accords well with our earlier findings. Recall, we report in Table 2 that the abatement effect of local institutional ownership is primarily driven by its influence over on-site toxic release. *localown* and *clean* both enter the regressions with a significantly positive sign if industry fixed effects are used, but are insignificant if firm fixed effects are used. Therefore, our results corroborate those in Servaes and Tamayo (2013), who find a significantly positive relation between Tobin's *Q* and the KLD rating of corporate social performance when controlling for industry fixed effects but the significance disappears when controlling for firm fixed effects.

In sum, our results are consistent with the idea that local institutional investors pressure firms to adopt value-enhancing pollution abatement policies.

5.3.2. Economic incentives of local institutions at different levels of consumer awareness

In our second-stage analysis, we first investigate whether the valuation effect of *clean*localown* is stronger for those firms that likely benefit more from CSR activities. The existing literature (e.g., Arora and Cason, 1995; Khanna and Damon, 1999; Servaes and Tamayo, 2013) shows that CSR activities are more beneficial for firms with a higher level of customer awareness. Following Servaes and Tamayo (2013), we use the amount of advertising expenses to proxy for the level of customer awareness. Table 10 Panel B reports the regression results when we estimate Eq. 4 separately for firms with positive advertising expenditures and those with zero advertising expenditures.[14] Consistent with the existing literature, we find that the positive effect of *clean*localown* is larger and statistically more significant for firms with high levels of customer awareness than for those with low levels of customer awareness. (A Wald test shows that the estimated coefficient of *clean*localown* is significantly different across the regressions of total release, columns (1) and (4), with a *p*-value of 0.062, but not significantly different across the regressions of on-site release, columns (2) and (5), with a *p*-value of 0.342).

5.3.3. Economic incentives of different types of local institutions

[14] Following the literature, we set missing values of advertising expenses to zero. Please see Section 3.1.1 for more details.

As the second test in our second-stage analysis, we examine whether the valuation effect of *clean**localown* is stronger for those types of institutions who have a greater economic incentive to pressure firms to engage in CSR. Table 10 Panel C reports the estimation results of Eq. 4 when we compare the valuation impact of pollution abatement policies conditioned on the stockholdings of long-term (or dedicated) local institutional investors (*localown_DED*) to that of short-term (or transient) local institutional investors (*localown_TRA*). The existing literature suggests (e.g., Jensen, 2001; Bénabou and Tirole, 2010) that long-term investors should value CSR more and have a greater incentive to pressure firms to engage in CSR. As discussed in Sections 3.3 and 5.1, we follow the literature and use Bushee (2001)'s classification to define long-term versus short-term institutional investors. The coefficient estimate of *clean* localown_DED* is significantly positive in total and on-site regressions, suggesting that corporate pollution abatement policies increase firm value when long-term institutional investors hold a larger ownership stake. In contrast, *clean* localown_TRA* is positive but insignificant in all regressions. Therefore, our results support the argument that CSR can be consistent with long-term value maximization of the firm.

Table 10 Panel D reports the estimation results of Eq. 4 when we compare the valuation impact of *clean* conditioned on the ownership of local independent institutions (*localown_INDEP*) to that of local grey institutions (*localown_GREY*). Voluminous literature (e.g., Brickley, et al., 1988; Hong and Kacperczyk, 2009) shows that independent institutions, defined as mutual funds and independent advisors, make investment decisions based on economic fundamentals rather than social or political considerations, as is frequently the case for grey institutions. Consistent with this idea, the coefficient estimate of *clean* localown_INDEP* is significantly positive in total and on-site regressions, suggesting that corporate pollution abatement policies increase firm value when independent institutions hold a larger ownership stake. In contrast, *clean* localown_GREY* is positive and insignificant in all regressions, albeit with a much larger estimated coefficient. Thus, the results are consistent with the argument that CSR activities can add value especially if implemented in accord with economic principles.

To summarize, Table 10 shows that shareholders have an economic incentive to influence corporate pollution abatement policies, and at least some of them exert their influence in an economically sensible fashion. Specifically, the valuation effect of pollution abatement policies conditioned on local institutional ownership is larger if firms are more likely to benefit from CSR activities. The valuation effect is also statistically more significant for those types of institutions that have a greater economic incentive to monitor CSR activities. Moreover, it is important to note that in our sample firms we find no evidence that corporate pollution abatement practices are detrimental to firm value – the coefficient estimate of *clean* is either significantly positive or insignificant in all the regressions.

5.3.4. Discussion

The preceding results may raise some eyebrows. For example, one could ask why pollution abatement policies driven by local investors should be more valuable than the policies alone. Alternatively, one could ask why firms with low local institutional ownership do not imitate the pollution abatement policies pursued by those with high local institutional ownership if the policies increase firm value. While it is beyond the scope of this paper to analyze these interesting and important questions, we offer two tentative explanations to put our results into a broader context. First, CSR is an extremely complex issue, as evidenced by the fact that there is still no commonly accepted definition of CSR (McWilliams and Siegel, 2001). A fierce debate also continues among practitioners and academics alike about the relation between CSR and firm value. The lack of clarity on this relation arises partly from methodological problems in conducting CSR research, but more importantly from a lack of understanding about the channels through which CSR affects firm value. Second, firms have only recently started to incorporate CSR into their business model. Evidence also suggests that pursuing CSR can require a large initial investment and significant changes to the organizational processes over time (Hart and Ahuja, 1996; Eccles et al., 2013).

In short, given the complex nature of CSR, it is not surprising that we lack a solution to the optimal CSR policy. Therefore, future research is needed to help us better understand under what circumstances CSR can enhance firm value and what organizational processes (e.g., disclosure standards and compensation structure) are needed for the effective implementation of CSR. Meanwhile, firms would be shrewd to elicit input from shareholders in incorporating CSR into their business model.

6. Conclusion

In the past two decades, corporations have come under enormous pressure to be socially responsible. In this paper, we analyze the relation between CSR activities and shareholder interests and preferences in an attempt to understand how today's corporations balance the pressure to be socially responsible against the goal of shareholder value maximization. We use facility-level toxic release data to proxy for CSR activities and use geographic distance between the location of institutional investors and the location of the facility that releases toxic chemicals into the environment to proxy for the intensity of shareholder interests and preferences. We find robust results that local institutional ownership reduces the amount of toxic release of the facility. We find consistent evidence that a firm's pollution abatement policies increase firm value when the firm has a higher level of local institutional ownership. This conditional effect is stronger if the firm faces a higher level of consumer awareness or if the local ownership is concentrated in long-term or independent institutions. We find no evidence that corporate pollution abatement policies are detrimental to firm value.

Overall, our results support Jensen (2001)'s theory of enlightened value maximization, which says firm value can only be maximized in the long run when the interests of shareholders and other stakeholders are aligned. Our results highlight the symbiotic relationship between corporations and the society within which the corporations reside. Fama and Jensen (1983) start their seminal paper with this opening statement: "Absent fiat, the form of organization that survives in an activity is the one that delivers the product demanded by customers at the lowest price while covering costs." It therefore logically follows that the only obligation of widely held public corporations is to maximize the value of the shareholders, who are the residual claimholders of the firm. However, whether a firm can deliver products most efficiently, thereby maximizing shareholder value, depends on the input and output prices that society is willing to bear. In other words, a firm succeeds by delivering products in the most efficient way as defined by society. As the needs and wants of society evolve, so does the meaning of efficiency. To give a simplistic example, at the start of the Industrial Revolution in the 1700s, firms could obliterate the competition by being the most efficient manufacturers without paying any attention to carbon emissions or water pollution. Today, firms are expected to pursue business strategies while adhering to the environmental standards that society outlines.

It is a challenge for managers to simultaneously pursue shareholder value maximization and social and environmental goals, and the task is viewed by some as a flawed proposition. As

Jensen (2001) eloquently states, “it is logically impossible to maximize in more than one dimension.” Our findings suggest that corporations may have figured out the solution to this puzzle. Specifically, firms formulate pollution abatement policies in response to shareholder interests and preferences.

Appendix A: Variable Description

This appendix provides variable definitions and computations. In parentheses and in italics, we also provide the mnemonics associated with each Compustat variable.

Variable Name	Variable Description
Panel A: Toxic release variables	
Total release	The natural logarithm of the total amount of *total* release of toxic chemicals in pounds of each facility
On-site release	The natural logarithm of the total amount of toxic release in pounds *at* the location of each facility
Off-site release	The natural logarithm of the total amount of toxic release in pounds *off* the location of each facility
Weighted release	The natural logarithm of the total amount of toxic release in pounds of each facility, weighting each chemical by the inverse of its Reportable Quantity (RQ)
Release ratio	The ratio of the total amount of toxic release in pounds of each facility to the company's revenue in millions of dollars
Residual release	The natural logarithm of the residual amount of toxic release of each facility. The residual amount of toxic release is the difference between the total (i.e., actual) amount of toxic release and the predicted amount of toxic release, which we estimate based on facility size, the three-digit SIC code, and year.
Clean	Residual release, multiplied by negative one
Panel B: Variables of institutional investors	
Localown	Ownership of institutions located within 150 miles of the facility
Totalown	Total institutional ownership of the firm
Localown_*	Ownership of institutions located within * miles of the facility. * denotes 50, 100 and 250, respectively
Localown_DED	Ownership of dedicated institutions (as defined in Bushee (2001)) located within 150 miles of the facility
Localown_TRA	Ownership of transient institutions (as defined in Bushee (2001)) located within 150 miles of the facility
Localown_INDEP	Ownership of independent institutions (mutual funds and independent investment advisors) located within 150 miles of the facility
Localown_GREY	Ownership of grey institutions (bank trusts, insurance companies, and other institutions) located within 150 miles of the facility
Localown_HQ	Ownership of institutions located within 150 miles of the corporate headquarters
Panel C: Variables of firm characteristics	
Facility_size	The natural logarithm of the number of employees at a facility
Firm_size	The natural logarithm of firm sales (*SALE*)
Firm_age	The natural logarithm of the number of years since the firm was included in the Compustat database
Slack	The ratio of cash plus short-term investments (*CH+IVST*) to total assets (*AT*)
Leverage	The ratio of long term debt (*DLTT*) plus debt in current liabilities (*DLC*) to total assets (*AT*)
R&D/sales	The ratio of R&D expenses to sales (*XRD*)/(*SALE*), set to zero if missing
AD/sales	The ratio of advertising expenses to sales (*XAD*)/(*SALE*), set to zero if missing
HHI	Herfindahl-Hirschman index, computed as the sum of squared market shares based on sales of a firm's three-digit SIC industry
Tobin's *Q*	Sum of total assets plus the market value of equity minus the book value of equity divided by total assets. Book value of equity is defined as stockholder's equity plus deferred taxes and investment tax credit, minus the value of preferred stock ((*AT* + *CSHO***PRCC_F*-(*SEQ* + TXDB + ITCB - PSTKRV))/*AT*)
ROA	Return on assets, which is computed as the ratio of earnings before extraordinary items (*IB*) to total asset (*AT*)
Sales_growth	$((SALE_t - SALE_{t-1})/SALE_t)$
Return volatility	Standard deviation of daily stock returns in the previous year (from CRSP)
%CEO ownership	Percent of CEO ownership (from EXEUCOMP)

Panel D: Other variables

Facility_HQ_distance	The natural logarithm of the distance in miles between a facility and the firm's headquarters
REG_stringency	A measure of the stringency of a state's environmental regulation. Following Meyer (1995) and King and Lenox (2001), we construct this measure as the inverse of the natural logarithm of the total amount of toxic release divided by the total number of employees in four main polluting industries: chemicals, petroleum, pulp and paper, and materials processing.

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Table 1
Summary statistics

This table provides summary statistics for 5,493 unique facilities or 820 unique firms from 1994 to 2010. All variables are winsorized at 1% at both tails. See Appendix A for variable definitions and descriptions.

	N	Mean	Std.	Min	Max
Panel A: Hazardous waste release at facility					
Total release	42,658	6.800	4.560	0.000	19.842
On-site release	42,658	5.870	4.721	0.000	19.842
Off-site release	42,658	2.754	4.029	0.000	17.546
Total release ratio	42,658	0.079	0.335	0.000	3.942
On-site release ratio	42,658	0.057	0.251	0.000	3.292
Off-site release ratio	42,658	0.008	0.043	0.000	0.515
Weighted total release	42,658	2.823	3.191	0.000	11.903
Weighted On-site release	42,658	2.282	2.799	0.000	10.906
Weighted Off-site release	42,658	1.104	2.522	0.000	10.967
Panel B: Institutional ownership					
Localown	42,658	0.029	0.066	0.000	0.659
Totalown	42,658	0.556	0.283	0.000	1.000
Localown_50	42,658	0.009	0.031	0.000	0.536
Localown_100	42,658	0.019	0.049	0.000	0.564
Localown_250	42,658	0.051	0.093	0.000	0.673
Localown_DED	42,658	0.006	0.021	0.000	0.154
Localown_TRA	42,658	0.010	0.024	0.000	0.160
Localown_INDEP	42,658	0.012	0.032	0.000	0.227
Localown_GREY	42,658	0.006	0.016	0.000	0.124
Localown_headquarter	42,658	0.111	0.111	0.000	0.592
Panel C: Firm operating characteristics					
Facility_size	42,658	4.964	1.440	0.000	9.903
Firm_size	42,658	7.809	1.556	2.702	12.326
Firm_age	42,658	3.092	0.864	0.693	4.094
Slack	42,658	0.072	0.103	0.000	1.047
Leverage	42,658	0.286	0.170	0.000	0.949
R&D/Sales	42,658	0.017	0.030	0.000	0.236
AD/Sales	42,658	0.005	0.014	0.000	0.114
HHI	42,658	0.192	0.158	0.031	1.000

Table 2
Impact of local institutional ownership on the total amount of toxic release

This table reports the regression results of the baseline model, which estimates the effect of local institutional ownership (*localown*) on the total amount of toxic release from a facility. The unit of analysis is facility year. The dependent variables are the natural logarithm of the total amount of total (*total*), on-site (*on-site*), and off-site (*off-site*) release of toxic chemicals. The main independent variable of interest is share ownership of institutions located within 150 miles of the facility that releases toxic chemicals into the environment. Variable definitions and descriptions are provided in Appendix A. All regressions include year- and firm- fixed effects. *t* statistics are shown in parentheses. Standard errors are adjusted for heteroskedasticity and facility clustering. ***, **, * indicate the significance level of less than 1%, 5%, and 10%, respectively, based on a two-tailed test.

	Dependent variable = Ln(Total amount of toxic release)		
	Total	On-site	Off-site
	(1)	(2)	(3)
Localown	-2.950***	-2.937***	0.239
	(-3.63)	(-3.46)	(0.29)
Facility_size	0.635***	0.613***	0.416***
	(15.68)	(14.61)	(11.58)
Firm_size	0.031	0.084	0.000
	(0.44)	(1.14)	(0.01)
Firm_age	-0.202	-0.184	-0.300**
	(-1.51)	(-1.35)	(-2.43)
Slack	0.194	-0.035	0.146
	(0.73)	(-0.13)	(0.58)
Leverage	0.271	0.134	0.082
	(1.35)	(0.66)	(0.43)
R&D / sales	-1.571	1.193	-3.290
	(-0.58)	(0.45)	(-1.43)
AD / sales	-10.047**	-10.798**	-2.449
	(-2.33)	(-2.44)	(-0.79)
HHI	-0.453	0.290	-1.428***
	(-0.86)	(0.55)	(-2.69)
Constant	5.284***	4.232***	1.291**
	(8.36)	(6.56)	(2.38)
YEAR FE	YES	YES	YES
FIRM FE	YES	YES	YES
Observations	42,658	42,658	42,658
Adj. R-squared	0.383	0.390	0.291

Table 3
Impact of local institutional ownership on the total amount of toxic release, at various distances

This table reports the regression results from estimating the effect of local institutional ownership on the total amount of toxic release from a facility, when local institutions are distinguished by different distances from the polluting facility. The unit of analysis is facility year. The dependent variables are the natural logarithm of the total amount of total (*total*), on-site (*on-site*), and off-site (*off-site*) release of toxic chemicals. The main independent variables of interest are share ownership of institutions located within 50 (*localown_50*), 100 (*localown_100*), and 250 (*localown_250*) miles of the polluting facility. Variable definitions and descriptions are provided in Appendix A. All regressions include year- and firm- fixed effects. *t* statistics are shown in parentheses. Standard errors are adjusted for heteroskedasticity and facility clustering. ***, **, * indicate the significance level of less than 1%, 5%, and 10%, respectively, based on a two-tailed test.

	Dependent variable = Ln(Total amount of toxic release)								
	Total			On-site			Off-site		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Localown_50	-5.198***			-6.070***			-0.178		
	(-3.02)			(-3.08)			(-0.12)		
Localown_100		-4.028***			-4.229***			0.479	
		(-3.65)			(-3.64)			(0.45)	
Localown_250			-1.681***			-1.874***			0.729
			(-2.92)			(-3.08)			(1.32)
Facility_size	0.634***	0.633***	0.636***	0.611***	0.610***	0.614***	0.416***	0.416***	0.417***
	(15.65)	(15.64)	(15.69)	(14.59)	(14.57)	(14.62)	(11.58)	(11.59)	(11.60)
Firm_size	0.036	0.032	0.035	0.089	0.084	0.088	0.001	0.000	-0.001
	(0.50)	(0.44)	(0.49)	(1.21)	(1.15)	(1.20)	(0.01)	(0.00)	(-0.02)
Firm_age	-0.226*	-0.215	-0.202	-0.206	-0.196	-0.180	-0.298**	-0.300**	-0.311**
	(-1.69)	(-1.61)	(-1.50)	(-1.52)	(-1.44)	(-1.32)	(-2.41)	(-2.43)	(-2.52)
Slack	0.185	0.208	0.202	-0.040	-0.018	-0.023	0.148	0.143	0.134
	(0.70)	(0.79)	(0.76)	(-0.16)	(-0.07)	(-0.09)	(0.59)	(0.57)	(0.54)
Leverage	0.272	0.270	0.264	0.132	0.133	0.124	0.080	0.083	0.092
	(1.35)	(1.34)	(1.31)	(0.65)	(0.65)	(0.61)	(0.42)	(0.43)	(0.48)
R&D / sales	-1.628	-1.519	-1.647	1.171	1.261	1.139	-3.262	-3.306	-3.348
	(-0.60)	(-0.56)	(-0.61)	(0.44)	(0.47)	(0.43)	(-1.42)	(-1.43)	(-1.45)
AD / sales	-10.186**	-10.104**	-10.157**	-10.898**	-10.838**	-10.877**	-2.412	-2.456	-2.529
	(-2.37)	(-2.35)	(-2.35)	(-2.47)	(-2.46)	(-2.46)	(-0.78)	(-0.79)	(-0.82)
HHI	-0.429	-0.448	-0.441	0.311	0.293	0.298	-1.432***	-1.427***	-1.419***
	(-0.81)	(-0.85)	(-0.83)	(0.59)	(0.56)	(0.57)	(-2.70)	(-2.69)	(-2.67)
Constant	5.302***	5.321***	5.252***	4.252***	4.271***	4.196***	1.291**	1.287**	1.307**
	(8.39)	(8.42)	(8.30)	(6.59)	(6.62)	(6.49)	(2.38)	(2.37)	(2.41)
YEAR FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
FIRM FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	42,658	42,658	42,658	42,658	42,658	42,658	42,658	42,658	42,658
Adj. R-squared	0.383	0.383	0.382	0.390	0.390	0.390	0.291	0.291	0.292

Table 4
Impact of local institutional ownership on the total amount of toxic release, by institution type

This table reports the regression results from estimating the effect of local ownership held by different types of institutions on the total amount of toxic release from a facility. The unit of analysis is facility year. The dependent variables are the natural logarithm of the amount of total (*total*), on-site (*on-site*), and off-site (*off-site*) release of toxic chemicals. In columns (1)-(3), the main independent variables of interest are stockholdings held by local dedicated institutions (*localown_DED*) and stockholdings held by local transient institutions (*localown_TRA*). In columns (4)-(6), the main independent variables are stockholdings held by local independent institutions (*localown_INDEP*) and stockholdings held by local grey institutions (*localown_GREY*). Variable definitions and descriptions are provided in Appendix A. All regressions include year- and firm- fixed effects. *t* statistics are shown in parentheses. Standard errors are adjusted for heteroskedasticity and facility clustering. ***, **, * indicate the significance level of less than 1%, 5%, and 10%, respectively, based on a two-tailed test.

	Dependent variable = Ln(Total amount of toxic release)					
	Total	On-site	Off-site	Total	On-site	Off-site
	(1)	(2)	(3)	(4)	(5)	(6)
Localown_DED	-4.910***	-4.697***	-0.427			
	(-2.89)	(-2.65)	(-0.28)			
Localown_TRA	-3.477	-4.847	2.987			
	(-0.92)	(-1.21)	(0.90)			
Localown_INDEP				-6.420***	-7.078***	-0.351
				(-2.89)	(-3.11)	(-0.16)
Localown_GREY				-1.886	-2.359	2.983
				(-0.95)	(-1.12)	(1.64)
Facility_size	0.633***	0.610***	0.416***	0.637***	0.614***	0.417***
	(15.64)	(14.57)	(11.59)	(15.71)	(14.64)	(11.60)
Firm_size	0.033	0.087	-0.001	0.033	0.086	-0.004
	(0.46)	(1.18)	(-0.02)	(0.45)	(1.16)	(-0.06)
Firm_age	-0.213	-0.193	-0.302**	-0.214	-0.193	-0.302**
	(-1.60)	(-1.42)	(-2.44)	(-1.60)	(-1.42)	(-2.45)
Slack	0.207	-0.021	0.146	0.203	-0.020	0.125
	(0.78)	(-0.08)	(0.58)	(0.77)	(-0.08)	(0.50)
Leverage	0.269	0.128	0.090	0.268	0.128	0.090
	(1.34)	(0.63)	(0.47)	(1.33)	(0.63)	(0.47)
R&D/sales	-1.533	1.224	-3.253	-1.505	1.304	-3.362
	(-0.56)	(0.46)	(-1.41)	(-0.55)	(0.49)	(-1.46)
AD/sales	-10.045**	-10.806**	-2.398	-10.019**	-10.716**	-2.529
	(-2.33)	(-2.45)	(-0.77)	(-2.32)	(-2.42)	(-0.81)
HHI	-0.441	0.300	-1.427***	-0.415	0.327	-1.425***
	(-0.83)	(0.57)	(-2.69)	(-0.78)	(0.62)	(-2.69)
Constant	5.303***	4.249***	1.296**	5.273***	4.218***	1.306**
	(8.40)	(6.59)	(2.39)	(8.34)	(6.52)	(2.41)
YEAR FE	YES	YES	YES	YES	YES	YES
FIRM FE	YES	YES	YES	YES	YES	YES
Observations	42,658	42,658	42,658	42,658	42,658	42,658
Adj. R-squared	0.383	0.390	0.291	0.383	0.390	0.292

Table 5
Robustness check, using alternative measures of toxic release

This table reports the regression results from estimating the effect of local institutional ownership on the amount of toxic release from a facility, using alternative measures of toxic release. The unit of analysis is facility year. In columns (1)-(3), the dependent variable is the natural logarithm of the weighted amount of total (*total*), on-site (*on-site*), and off-site (*off-site*) release of toxic chemicals. We calculate the weighted amount by weighting each chemical by the inverse of its Reportable Quantity. In columns (4)-(6), the dependent variable is the ratio of the amount of total (*total*), on-site (*on-site*), and off-site (*off-site*) release of toxic chemicals in pounds from a facility to the company's revenue in millions of dollars. Variable definitions and descriptions are provided in Appendix A. All regressions include year- and firm- fixed effects. *t* statistics are shown in parentheses. Standard errors are adjusted for heteroskedasticity and facility clustering. ***, **, * indicate the significance level of less than 1%, 5%, and 10%, respectively, based on a two-tailed test.

Dependent variable =	Weighted toxic release			Ratio of toxic release		
	Total	On-site	Off-site	Total	On-site	Off-site
	(1)	(2)	(3)	(4)	(5)	(6)
Localown	-2.239***	-2.504***	0.275	-0.123***	-0.088***	-0.013***
	(-3.52)	(-4.94)	(0.49)	(-2.89)	(-2.80)	(-2.94)
Facility_size	0.428***	0.367***	0.240***	0.019***	0.014***	0.002***
	(14.58)	(14.26)	(9.74)	(8.19)	(6.96)	(6.79)
Firm_size	0.000	0.007	-0.004	-0.058***	-0.034***	-0.005***
	(0.00)	(0.16)	(-0.11)	(-7.21)	(-5.42)	(-6.24)
Firm_age	-0.025	-0.016	-0.005	-0.049***	-0.049***	-0.001
	(-0.26)	(-0.20)	(-0.06)	(-4.30)	(-5.55)	(-0.65)
Slack	0.205	0.150	0.066	-0.064**	-0.049**	-0.003
	(1.22)	(1.02)	(0.49)	(-2.05)	(-2.13)	(-0.78)
Leverage	0.177	0.089	0.137	-0.010	0.004	-0.007**
	(1.23)	(0.72)	(1.14)	(-0.34)	(0.16)	(-2.27)
R&D/sales	1.743	1.145	0.299	0.901**	0.596***	0.028
	(1.09)	(0.82)	(0.25)	(2.18)	(2.85)	(0.56)
AD/sales	-1.277	-0.684	-0.082	0.043	0.046	-0.006
	(-0.49)	(-0.29)	(-0.05)	(0.15)	(0.22)	(-0.15)
HHI	-0.653*	0.004	-1.224***	0.026	0.026	-0.008*
	(-1.78)	(0.01)	(-3.83)	(0.68)	(0.86)	(-1.70)
Constant	1.488***	1.180***	0.062	0.578***	0.410***	0.047***
	(3.56)	(3.23)	(0.18)	(9.21)	(8.39)	(6.80)
YEAR FE	YES	YES	YES	YES	YES	YES
FIRM FE	YES	YES	YES	YES	YES	YES
Observations	42,658	42,658	42,658	42,658	42,658	42,658
Adj. R-squared	0.350	0.386	0.249	0.404	0.406	0.280

Table 6
Causality check – the change-on-change test

Panel A reports the estimates from regressing changes in toxic release on changes in local institutional ownership. The unit of analysis is facility year. We run separate regressions for positive and negative changes in local institutional ownership. The dependent variables are the changes in the natural logarithm of the total amount of total (*$total_t$*), on-site (*$on\text{-}site_t$*), and off-site (*$off\text{-}site_t$*) release of toxic chemicals. The main independent variable of interest is the lagged changes in local institutional ownership (*$\Delta localown_{t-1}$*). All other independent variables are lagged by one year. Variable definitions and descriptions are provided in Appendix A. All regressions include industry- (three-digit SIC code) and year- fixed effects. *t* statistics are shown in parentheses. Standard errors are adjusted for heteroskedasticity and facility clustering. ***, **, * indicate the significance level of less than 1%, 5%, and 10%, respectively, based on a two-tailed test.

Panel A	Dependent variable = Δtoxic release					
	Positive change in localown			Negative change in localown		
	$Total_t$	$On\text{-}site_t$	$Off\text{-}site_t$	$Total_t$	$On\text{-}site_t$	$Off\text{-}site_t$
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta Localown_{t-1}$	-1.300***	-1.332***	-0.571	0.716	0.645	0.043
	(-2.88)	(-2.87)	(-1.06)	(1.30)	(1.31)	(0.06)
Total $release_{t-1}$	-0.089***			-0.092***		
	(-19.30)			(-19.24)		
On-site $release_{t-1}$		-0.079***			-0.080***	
		(-19.71)			(-18.72)	
Off-site $release_{t-1}$			-0.137***			-0.141***
			(-20.86)			(-21.44)
$\Delta Facility\_size_{t-1}$	0.015	-0.001	0.032	0.005	-0.018	-0.013
	(0.51)	(-0.03)	(0.79)	(0.17)	(-0.58)	(-0.50)
$\Delta Firm\_size_{t-1}$	0.063	0.041	0.125	0.170*	0.131	0.170*
	(0.96)	(0.64)	(1.42)	(1.95)	(1.48)	(1.85)
$\Delta Firm\_age_{t-1}$	-0.456*	-0.351	-0.283	0.139	0.112	-0.060
	(-1.86)	(-1.42)	(-1.04)	(0.43)	(0.36)	(-0.17)
$\Delta Slack_{t-1}$	0.091	0.140	-0.175	0.115	-0.118	0.619**
	(0.43)	(0.64)	(-0.68)	(0.53)	(-0.62)	(2.15)
$\Delta Leverage_{t-1}$	-0.203	-0.092	-0.179	-0.097	-0.090	-0.199
	(-1.12)	(-0.52)	(-0.79)	(-0.49)	(-0.46)	(-0.94)
$\Delta R\&D/Sales_{t-1}$	-1.846	1.076	-0.311	2.092	3.653***	1.224
	(-1.22)	(0.79)	(-0.13)	(1.15)	(2.60)	(0.48)
$\Delta AD/Sales_{t-1}$	-2.792	-1.224	-1.124	-4.290	-5.009	-0.774
	(-0.86)	(-0.41)	(-0.42)	(-1.07)	(-1.33)	(-0.23)
ΔHHI_{t-1}	-0.110	0.577	-0.660	-0.909	-0.237	-0.545
	(-0.21)	(1.23)	(-1.15)	(-1.60)	(-0.46)	(-0.98)
Constant	0.557***	0.401***	0.472***	0.607***	0.376***	0.433***
	(8.27)	(6.99)	(6.74)	(9.24)	(6.68)	(6.23)
YEAR FE	YES	YES	YES	YES	YES	YES
INDUSTRY FE	YES	YES	YES	YES	YES	YES
Observations	13,368	13,368	13,368	12,277	12,277	12,277
Adj. R-squared	0.041	0.038	0.070	0.046	0.039	0.074

Table 6, cont'd

Panel B reports the estimates from regressing changes in local institutional ownership on changes in toxic release. The unit of analysis is facility year. We run separate regressions for positive and negative changes in toxic release. The dependent variable is change in local institutional ownership (*$\Delta localown_t$*). The main independent variable of interest is the lagged changes in the natural logarithm of the total amount of total (*$total_{t-1}$*), on-site (*$on\text{-}site_{t-1}$*), and off-site (*$off\text{-}site_{t-1}$*) release of toxic chemicals. All other independent variables are also lagged by one year. Variable definitions and descriptions are provided in Appendix A. All regressions include industry- (three-digit SIC code) and year- fixed effects. *t* statistics are shown in parentheses. Standard errors are adjusted for heteroskedasticity and facility-level clustering. ***, **, * indicate the significance level of less than 1%, 5%, and 10%, respectively, based on a two-tailed test.

Panel B	Dependent variable = $\Delta localown_t$					
	Positive change in toxic release			Negative change in toxic release		
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta Total_{t-1}$	-0.000			-0.000		
	(-1.37)			(-1.32)		
$\Delta On\text{-}site_{t-1}$		0.000			-0.000	
		(0.60)			(-0.06)	
$\Delta Off\text{-}site_{t-1}$			-0.000**			0.000
			(-2.23)			(0.07)
$\Delta Facility\_size_{t-1}$	0.001	0.001	0.001	0.001*	0.001	0.001**
	(0.91)	(1.26)	(0.55)	(1.83)	(1.49)	(2.20)
$\Delta Firm\_size_{t-1}$	-0.001	-0.000	-0.001	-0.001	-0.000	-0.006*
	(-0.60)	(-0.32)	(-0.46)	(-0.59)	(-0.22)	(-1.67)
$\Delta Firm\_age_{t-1}$	0.006	0.010*	0.003	0.006	0.007*	0.011
	(1.23)	(1.84)	(0.39)	(1.24)	(1.74)	(1.07)
$\Delta Slack_{t-1}$	-0.005	-0.005	0.000	0.003	0.003	0.002
	(-1.31)	(-1.30)	(0.04)	(0.72)	(0.69)	(0.28)
$\Delta leverage_{t-1}$	-0.004	-0.002	0.000	-0.000	-0.001	-0.002
	(-1.47)	(-0.54)	(0.05)	(-0.05)	(-0.14)	(-0.45)
$\Delta R\&D/Sales_{t-1}$	0.012	0.056**	0.001	0.033	0.014	0.029
	(0.45)	(2.21)	(0.06)	(1.26)	(0.69)	(0.66)
$\Delta AD/Sales_{t-1}$	0.038	0.033	-0.048	-0.027	-0.029	-0.108
	(1.19)	(0.96)	(-0.97)	(-0.75)	(-0.82)	(-1.05)
ΔHHI_{t-1}	-0.005	-0.005	-0.020	-0.000	-0.006	0.007
	(-0.66)	(-0.60)	(-1.54)	(-0.01)	(-0.58)	(0.57)
Constant	-0.001	-0.003**	-0.000	-0.002*	-0.002*	-0.002
	(-0.58)	(-2.56)	(-0.15)	(-1.92)	(-1.88)	(-1.49)
YEAR FE	YES	YES	YES	YES	YES	YES
INDUSTRY FE	YES	YES	YES	YES	YES	YES
Observations	9,706	8,506	5,409	10,776	9,743	5,257
Adj. R-squared	0.014	0.019	0.023	0.010	0.016	0.022

Table 7
Causality check – the dynamic generalized method of moments (GMM) panel estimation method

This table reports the regression results from estimating the effect of local institutional ownership (*localown*) on the total amount of toxic release from a facility. The unit of analysis is facility year. The dependent variables are the natural logarithm of the total amount of total (*total*), on-site (*on-site*), and off-site (*off-site*) release of toxic chemicals. *Localown* is share ownership of institutions located within 150 miles of the facility that releases toxic chemicals. We also report the results of specification tests from the GMM analysis. Specifically, if the assumptions of the specification are valid, residuals in the first differences (AR(1)) should be correlated, but no serial correlation should be found in second differences (AR(2)). The null hypothesis of the Hansen test is that the instruments used are not correlated with the residuals. The specification tests suggest that the assumptions for the GMM estimation validity are met. Variable definitions and descriptions are provided in Appendix A. As GMM accounts for time-invariant firm heterogeneities, we control for year- and industry- fixed effects. *t* statistics are shown in parentheses. Standard errors are adjusted for heteroskedasticity and facility clustering. ***, **, * indicate the significance level of less than 1%, 5%, and 10%, respectively, based on a two-tailed test.

	Dependent variable = Ln(Total amount of toxic release)		
	Total	On-site	Off-site
	(1)	(2)	(3)
Localown	-1.486*	-2.013**	0.027
	(-1.94)	(-2.30)	(0.03)
$Total_{t-1}$	1.030***		
	(4.29)		
$Total_{t-2}$	-0.163		
	(-1.01)		
$On\text{-}site_{t-1}$		1.142***	
		(4.74)	
$On\text{-}site_{t-2}$		-0.240	
		(-1.48)	
$Off\text{-}site_{t-1}$			0.735***
			(3.14)
$Off\text{-}site_{t-2}$			0.152
			(0.83)
Facility_size	-0.099	-0.054	-0.167**
	(-1.51)	(-0.84)	(-2.26)
Firm_size	0.021	0.068	0.104
	(0.33)	(1.17)	(0.92)
Firm_age	-0.025	-0.046	-0.045
	(-0.48)	(-0.88)	(-0.71)
Slack	1.822*	1.706*	-0.359
	(1.79)	(1.80)	(-0.30)
Leverage	-0.017	0.162	-0.018
	(-0.04)	(0.38)	(-0.04)
R&D/sales	-2.556	-0.570	0.296
	(-0.85)	(-0.20)	(0.07)
AD/sales	8.215	8.006	11.415
	(0.94)	(1.02)	(1.30)
HHI	-0.391	-0.226	-0.100
	(-1.42)	(-0.80)	(-0.26)
Constant	1.210	0.238	0.421
	(1.53)	(0.32)	(0.64)

AR(1) test (*p*-value)	0.002	0.001	0.042
AR(2) test (*p*-value)	0.200	0.228	0.726
Hansen test (*p*-value)	0.858	0.828	0.204
YEAR FE	YES	YES	YES
INDUSTRY FE	YES	YES	YES
FIRM FE	N.A.	N.A.	N.A.
Observations	32,008	32,008	32,008
Adj. R-squared	N.A.	N.A.	N.A.

Table 8
Robustness check – addresses the potential problem of omitted variables and compares the effect of local institutional ownership to the effect of other institutional ownership measures

This table reports the regression results estimating the effect of local institutional ownership on the total amount of toxic release from each facility. The unit of analysis is facility year. The dependent variable is the natural logarithm of the total amount of toxic chemicals released into the environment by a facility. The main independent variable of interest is the stockholdings by institutional investors located within 150 miles of the emitting facility (*localown*). *Facility_HQ_distance* is the natural logarithm of the distance in miles between a facility and the firm's headquarters. *REG_stringency* measures the stringency of a state's environmental regulation. Following Meyer (1995) and King and Lenox (2001), we construct this measure as the inverse of the natural logarithm of the total amount of toxic release divided by the total number of employees in four main polluting industries: chemicals, petroleum, pulp and paper, and materials processing. *CEO ownership* is the fraction of the company shares owned by the CEO. We obtain CEO ownership data from Execucomp. *Totalown* is the total institutional ownership of the firm. *Localown_HQ* is the ownership of institutions located within 150 miles of the corporate headquarters. We obtain headquarters data for the period of 1994-2006 from Compact Disclosure and for the period of 2007-2010 from the CRSP-Compustat Merged Database. Variable definitions and descriptions are provided in Appendix A. In each regression, we include a constant and proxies for facility and firm characteristics, namely facility_size, firm_size, firm_age, slack, leverage, R&D/sales, AD/sales, and HHI. Coefficient estimates of these variables are not reported to conserve space and are available upon request. FE indicates that a model accounts for the respective fixed effect. *t* statistics are shown in parentheses. Standard errors are adjusted for heteroskedasticity and facility clustering. ***, **, * indicate the significance level of less than 1%, 5%, and 10%, respectively, based on a two-tailed test.

	Dependent variable = Ln(Total amount of toxic release)							
	Control for location effect (LOC)		Control for state regulation (REG)		Control for LOC & REG	Control for private benefits	Compared to other institutional ownership measures	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Localown	-3.169***	-3.416***	-2.786***	-2.299**	-2.609***	-2.746***		-2.155**
	(-3.22)	(-2.75)	(-3.40)	(-2.40)	(-2.75)	(-2.94)		(-2.15)
Facility_HQ_distance		-0.136***			-0.108***			
		(-3.58)			(-2.76)			
REG_stringency			-1.316*					
			(-1.78)					
CEO ownership						0.006		
						(0.48)		
Totalown							0.201	
							(1.29)	
Localown_HQ								-0.540
								(-1.11)
Facility & firm controls	YES	YES	YES	YES	YES	YES	YES	YES
YEAR FE	YES	YES	YES	YES	YES	YES	YES	YES
FIRM FE	YES	YES	YES	YES	YES	YES	YES	YES
MSA FE	YES	NO	NO	YES	YES	NO	NO	YES
STATE FE	NO	NO	NO	YES	YES	NO	NO	YES
Observations	42,658	42,658	42,585	42,658	42,658	30,096	42,658	42,658
Adj. R-squared	0.419	0.404	0.394	0.447	0.447	0.360	0.382	0.431

Table 9
Impact of local institutional ownership on the predicted and the residual amount of toxic release

Panel A reports the regression results from estimating the effect of local institutional ownership (*localown*) on the natural logarithm of the residual amount of toxic release (*Ln(Residual release)*) and the natural logarithm of the predicted amount of toxic release (*Ln(Predicted release)*). The unit of analysis is facility year. We estimate the predicted amount of toxic release of each facility given its size, the three-digit SIC code, and year. The residual amount of toxic release is the difference between the actual amount of toxic release and the predicted amount of toxic release. The main independent variable of interest is stockholdings by institutions located within 150 miles of the facility that releases toxic chemicals. Variable definitions and descriptions are provided in Appendix A. All regressions include year- and firm- fixed effects. *t* statistics are shown in parentheses. Standard errors are adjusted for heteroskedasticity and facility clustering. ***, **, * indicate the significance level of less than 1%, 5%, and 10%, respectively, based on a two-tailed test.

Panel A	Ln(Residual release)			Ln(Predicted release)		
	Total	On-site	Off-site	Total	On-site	Off-site
	(1)	(2)	(3)	(4)	(5)	(6)
Localown	-2.670***	-2.493***	-0.051	-0.144	-0.051	0.132
	(-3.23)	(-2.90)	(-0.06)	(-0.58)	(-0.19)	(0.61)
Facility_size	-0.013	-0.033	0.047	0.702***	0.672***	0.417***
	(-0.39)	(-0.96)	(1.46)	(26.18)	(23.52)	(21.42)
Firm_size	-0.006	0.068	-0.050	0.028	0.049	-0.026
	(-0.09)	(0.90)	(-0.76)	(0.93)	(1.45)	(-1.10)
Firm_age	-0.322**	-0.299**	-0.258**	0.189***	0.130**	0.071*
	(-2.41)	(-2.21)	(-1.98)	(3.64)	(2.25)	(1.65)
Slack	0.061	-0.025	0.039	0.213*	0.018	0.281***
	(0.21)	(-0.09)	(0.14)	(1.78)	(0.15)	(3.08)
Leverage	0.026	-0.066	0.087	0.000	-0.005	0.051
	(0.13)	(-0.31)	(0.42)	(0.01)	(-0.05)	(0.61)
R&D / sales	4.754*	6.582**	0.362	-1.744	-3.114**	1.777**
	(1.74)	(2.45)	(0.14)	(-1.52)	(-2.53)	(2.12)
AD / sales	1.465	1.133	-2.479	-9.575***	-10.871***	-2.412***
	(0.31)	(0.24)	(-0.83)	(-5.49)	(-5.67)	(-2.61)
HHI	-0.395	-0.464	-0.403	1.139***	1.969***	-0.433**
	(-0.60)	(-0.70)	(-0.66)	(4.56)	(7.58)	(-2.00)
Constant	1.001	0.520	0.867	3.659***	3.148***	0.198
	(1.54)	(0.78)	(1.54)	(13.33)	(10.32)	(0.95)
YEAR FE	YES	YES	YES	YES	YES	YES
FIRM FE	YES	YES	YES	YES	YES	YES
Observations	34,727	34,727	34,727	34,727	34,727	34,727
Adj. R-squared	0.169	0.189	0.142	0.763	0.760	0.738

Table 9, cont'd

Panel B reports the regression results from estimating the effect of local institutional ownership (*localown*) on the natural logarithm of the residual amount of toxic release, when we run separate regressions for observations associated with positive and negative residual amounts, respectively. The unit of analysis is facility year. To get the residual amount of toxic release, we first estimate the predicted amount of toxic release of each facility given its size, industry (measured at the three-digit SIC code level), and year. The residual amount of toxic release is the difference between the actual amount of toxic release and the predicted amount of toxic release. The dependent variables are the natural logarithm of the residual amount of toxic release. The main independent variable of interest is stockholdings by institutions located within 150 miles of the facility that releases toxic chemicals. Variable definitions and descriptions are provided in Appendix A. All regressions include year- and firm- fixed effects. *t* statistics are shown in parentheses. Standard errors are adjusted for heteroskedasticity and facility clustering. ***, **, * indicate the significance level of less than 1%, 5%, and 10%, respectively, based on a two-tailed test.

Panel B	Ln(Positive residual release)			Ln(Negative residual release)		
	Total	On-site	Off-site	Total	On-site	Off-site
	(1)	(2)	(3)	(4)	(5)	(6)
Localown	-1.237***	-1.135**	-0.368	-0.887	-0.419	-0.430
	(-2.69)	(-2.00)	(-0.55)	(-1.63)	(-0.94)	(-1.60)
Facility_size	-0.171***	-0.141***	0.139***	-0.040	-0.145***	-0.238***
	(-7.35)	(-4.96)	(3.64)	(-1.41)	(-5.51)	(-15.41)
Firm_size	0.013	0.042	0.084	-0.027	0.082	0.054*
	(0.27)	(0.76)	(1.12)	(-0.37)	(1.26)	(1.83)
Firm_age	-0.141*	-0.170*	-0.304**	0.038	-0.047	-0.092
	(-1.74)	(-1.73)	(-2.06)	(0.29)	(-0.39)	(-1.64)
Slack	0.025	0.137	0.348	-0.128	-0.302	-0.124
	(0.12)	(0.57)	(1.08)	(-0.48)	(-1.39)	(-0.93)
Leverage	-0.263*	-0.163	-0.051	-0.052	0.095	-0.104
	(-1.77)	(-0.96)	(-0.21)	(-0.24)	(0.52)	(-0.95)
R&D / sales	1.948	2.530	-2.397	2.858	1.807	-1.671*
	(1.37)	(1.54)	(-1.01)	(1.05)	(0.80)	(-1.85)
AD / sales	3.648	3.008	-9.014*	1.150	6.308	2.079**
	(1.36)	(0.99)	(-1.86)	(0.27)	(1.52)	(2.23)
HHI	-0.052	0.090	1.271*	-1.130*	-0.790	0.573**
	(-0.13)	(0.18)	(1.82)	(-1.85)	(-1.48)	(2.13)
Constant	3.464***	3.329***	3.858***	-2.619***	-3.015***	-0.903***
	(8.42)	(6.66)	(5.85)	(-4.37)	(-5.78)	(-3.46)
YEAR FE	YES	YES	YES	YES	YES	YES
FIRM FE	YES	YES	YES	YES	YES	YES
Observations	18,827	17,692	12,492	15,800	17,305	20,908
Adj. R-squared	0.272	0.295	0.254	0.263	0.308	0.545

Table 10
Impact on firm performance

Table 10 reports the regression results from relating firm performance (Tobin's *Q*) to corporate pollution abatement policies and local institutional ownership. The main independent variable of interests is *clean*localown*. *Clean* is the natural logarithm of the residual amount of toxic release (*residual release*), multiplied by negative one. *Localown* is the stockholdings by institutions located within 150 miles of the facility that releases toxic chemicals into the environment. The unit of analysis is firm year. To get firm-level measures of *clean* and *localown*, we weigh the facility-level data by the ratio of the number of employees at the facility over the total number of employees of the firm and take the weighted sum. Panel B reports the estimation results separately for firms with high and low levels of consumer awareness. We classify firms as facing high (low) levels of consumer awareness if its advertising expenses over sales is positive (zero or missing). Panel C reports the estimation results from relating Tobin's *Q* to corporate pollution abatement policies and different types of local institutional ownership. *localown_DED* is stockholdings by local dedicated institutions. *localown_TRA* is stockholdings by local transient institutions. *localown_INDEP* is stockholdings by local independent institutions. *localown_GREY* is stockholdings by local grey institutions. Definitions and descriptions of variables are provided in Appendix A. All regressions include industry- and year- fixed effects. *t* statistics are shown in parentheses. Standard errors are adjusted for heteroskedasticity and firm-level clustering. ***, **, * indicate the significance level of less than 1%, 5%, and 10%, respectively, based on a two-tailed test.

Panel A	Dependent variable = Tobin's *Q*					
	Total	On-site	Off-site	Total	On-site	Off-site
	(1)	(2)	(3)	(4)	(5)	(6)
Clean*localown	0.811***	0.675**	-0.074	0.821***	0.557*	0.027
	(2.58)	(2.26)	(-0.23)	(2.62)	(1.85)	(0.09)
Localown	0.245**	0.235*	0.214*	0.202	0.196	0.122
	(1.99)	(1.90)	(1.85)	(1.55)	(1.49)	(0.99)
Clean	0.034***	0.016*	0.022***	0.011	-0.006	0.007
	(3.58)	(1.73)	(2.84)	(1.09)	(-0.51)	(0.80)
Firm_size	-0.001	-0.002	-0.008	-0.266***	-0.268***	-0.244***
	(-0.16)	(-0.19)	(-0.92)	(-11.23)	(-11.31)	(-11.28)
Firm_age	0.042***	0.043***	0.026*	-0.121***	-0.116***	-0.129***
	(2.84)	(2.89)	(1.92)	(-2.75)	(-2.63)	(-3.25)
ROA	3.263***	3.253***	2.794***	3.838***	3.873***	3.585***
	(26.66)	(26.55)	(26.53)	(27.44)	(27.59)	(30.33)
Sales_growth	0.468***	0.471***	0.431***	0.316***	0.317***	0.242***
	(12.38)	(12.43)	(13.07)	(9.30)	(9.33)	(8.23)
R&D / sales	7.763***	7.812***	7.869***	-0.195	-0.219	0.351
	(23.04)	(23.20)	(24.80)	(-0.29)	(-0.32)	(0.56)
Leverage	-0.597***	-0.600***	-0.611***	-0.519***	-0.513***	-0.558***
	(-8.56)	(-8.59)	(-9.78)	(-6.10)	(-6.03)	(-7.30)
Return_volatility	5.448***	5.430***	3.589***	5.726***	5.731***	3.868***
	(5.91)	(5.88)	(4.43)	(6.13)	(6.13)	(4.80)
Constant	0.931***	0.931***	1.064***	2.918***	2.920***	2.896***
	(5.67)	(5.67)	(8.01)	(14.21)	(14.21)	(16.57)
YEAR FE	YES	YES	YES	YES	YES	YES
INDUSTRY FE	YES	YES	YES	NO	NO	NO
FIRM FE	NO	NO	NO	YES	YES	YES
Observations	5,720	5,720	5,720	5,720	5,720	5,720
Adj. R-squared	0.388	0.387	0.372	0.668	0.668	0.657

Table 10, cont'd

Panel B	Dependent variable = Tobin's *Q*					
	High consumer awareness			Low consumer awareness		
	Total	On-site	Off-site	Total	On-site	Off-site
	(1)	(2)	(3)	(4)	(5)	(6)
Clean*localown	2.118**	1.304*	0.554	0.782**	0.662**	0.189
	(2.57)	(1.65)	(0.76)	(2.33)	(2.07)	(0.54)
Localown	0.514*	0.468	0.225	0.022	0.018	0.028
	(1.75)	(1.57)	(0.89)	(0.16)	(0.12)	(0.20)
Clean	0.033	0.007	0.020	0.008	-0.004	0.011
	(1.44)	(0.26)	(1.38)	(0.63)	(-0.29)	(0.99)
Firm controls	YES	YES	YES	YES	YES	YES
YEAR FE	YES	YES	YES	YES	YES	YES
FIRM FE	YES	YES	YES	YES	YES	YES
Observations	1,176	1,176	1,176	4,544	4,544	4,544
Adj. R-squared	0.754	0.753	0.744	0.690	0.690	0.678

Panel C	Dependent variable = Tobin's *Q*					
	Total	On-site	Off-site	Total	On-site	Off-site
	(1)	(2)	(3)	(4)	(5)	(6)
Clean*localown_DED	1.842***	1.421***	0.633			
	(3.95)	(3.59)	(1.61)			
Localown_DED	0.911**	0.857*	0.862**			
	(2.06)	(1.94)	(2.09)			
Clean*localown_TRA				0.674	0.561	0.452
				(1.50)	(1.25)	(1.06)
Localown_TRA				0.492	0.482	0.213
				(1.12)	(1.10)	(0.52)
Clean	0.006	-0.011	0.008	-0.001	-0.014	0.006
	(0.66)	(-1.18)	(1.04)	(-0.14)	(-1.61)	(0.88)
Firm controls	YES	YES	YES	YES	YES	YES
YEAR FE	YES	YES	YES	YES	YES	YES
FIRM FE	YES	YES	YES	YES	YES	YES
Observations	5,720	5,720	5,720	5,720	5,720	5,720
Adj. R-squared	0.653	0.653	0.640	0.652	0.652	0.640

Table 10, cont'd

Panel D	Dependent variable = Tobin's *Q*					
	Total	On-site	Off-site	Total	On-site	Off-site
	(1)	(2)	(3)	(4)	(5)	(6)
Clean*localown_INDEP	0.535***	0.486***	0.217			
	(2.86)	(2.98)	(1.35)			
Localown_ INDEP	0.358**	0.340**	0.201			
	(2.09)	(1.99)	(1.26)			
Clean*localown_GREY				1.465	0.789	0.706
				(1.24)	(0.73)	(0.61)
Localown_GREY				0.303	0.328	0.174
				(0.73)	(0.79)	(0.45)
Clean	0.005	-0.009	0.008	0.003	-0.011	0.007
	(0.62)	(-1.00)	(1.06)	(0.33)	(-1.16)	(0.92)
Firm controls	YES	YES	YES	YES	YES	YES
YEAR FE	YES	YES	YES	YES	YES	YES
FIRM FE	YES	YES	YES	YES	YES	YES
Observations	5,720	5,720	5,720	5,720	5,720	5,720
Adj. R-squared	0.653	0.654	0.640	0.653	0.653	0.640