Sustainability or Greenwashing: Evidence from the Asset Market for Industrial Pollution

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Abstract

This paper provides novel evidence on the role of pollution in the divestitures of industrial plants. We find that firms divest pollutive plants following scrutinized environmental risk incidents. Following these divestitures, however, total pollution levels at the sold plants do not decline, and per-employee pollution levels increase. Furthermore, the sellers do not fully lose access to these plants, since they are sold to firms with supply chain relationships or joint ventures with the sellers. The sellers, however, earn higher environmental, social, and governance (ESG) ratings, reduce their regulatory compliance costs, and improve their access to government resources. Overall, the evidence suggests that the asset market allows firms to redraw their boundaries in a manner perceived as environmentally friendly without real consequences for pollution levels or production processes.

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1 Introduction

A growing trend in corporate finance, a result of pressure from activists, regulators and governments, is the divestment of polluting assets. A recent article in the Economist, for example, reports that: "the West's six biggest oil companies have shed $44bn of mostly fossil-fuel assets since the start of 2018."[1] Consistent with this trend, Figure 1 shows that the average value of divestitures of polluting assets has increased considerably since 2015.

While this trend reflects mounting concerns about climate change, it has raised the question of how effective such divestments are. On the one hand, Environmental, Social, and Governance (ESG) supporters can point to successful pressures that have encouraged many firms to sell off dirty assets. On the other hand, as a recent article by James Mackintosh in the Wall Street Journal concludes: "Sadly, selling off assets or shares by itself does nothing to save the planet, because someone else bought them."[2] This view further raises concerns that the divestment of polluting assets is a "green-washing" strategy through which firms convey a false impression that they are more environmentally sound. Indeed, as Figure 2 shows, attention to "green washing" has risen more than eight-fold since 2004 based on Google Trends.

In this paper, we aim to shed new light on this question by studying the reallocation of industrial pollution through acquisitions and sales of divested assets in the real asset market. Specifically, we examine what triggers the divestitures of pollutive assets, how toxic releases change around the transfer of ownership, and how sellers can benefit from those transactions. The goal of these analyses is to help unveil the motives and economic forces behind the movement to divest pollution. If driven by green-washing, divestitures can bring disproportionate benefits to sellers compared to the environmental impact. If directed by market forces that efficiently allocate assets to owners most capable of treating pollution, divestitures should lead to significant reductions in toxic release.

To evaluate these issues, we compile a novel dataset of 719 divestitures of pollutive assets from 2000 to 2020, and investigate their determinants and consequences across

[1] "Who buys the dirty energy assets public companies no longer want?" The Economist, February 12th, 2022 edition.

[2] "Why the Sustainable Investment Craze Is Flawed?" The Wall Street Journal, January 23rd, 2022.

buyers and sellers. We hand-collect and merge data from several databases, including divestiture data from the Securities Data Company (SDC) database, plants' toxic release levels from the Environmental Protection Agency's (EPA) Toxic Release Inventory (TRI) database, plant-level employment data from the National Establishment Time-Series (NETS) database, ESG ratings from the Kinder, Lydenberg, and Domini (KLD) database, ESG-related incidents from Factset's RepRisk ESG Business Intelligence database, U.S. federal government procurement contract-level data from the Federal Procurement Data System (FPDS), and supply-chain and joint ventures information from the Compustat Segment, Factset, and SDC databases.

We begin the empirical analyses by investigating the determinants of pollutive asset divestitures. These analyses provide two key findings. First, parent firms are more likely to divest an asset if it pollutes more. The estimates suggest that an increase of one standard deviation in the level of a plant's toxic release or the amount of toxic release per employee leads to an increase of 12% to 15% in the likelihood of divestment relative to the average level of divestment in our sample. These estimates continue to hold after including plant fixed effects, industry-by-year, and state-by-year fixed effects.

Second, we show that firms divest pollutive assets following incidents related to ESG risks, and particularly incidents related to environmental risks. The estimates indicate that the occurrence of environmental risk incidents increases the likelihood of divesting a pollutive asset by 1.3 percentage points, or 92% relative to the sample mean. These estimates continue to hold after including firm fixed effects and industry-by-year fixed effects. Importantly, we find that divestitures of non-pollutive assets, which do not release toxics, are uncorrelated with the occurrence of ESG risk incidents. This finding mitigates concerns about a mechanical relation between ESG risk incidents and divestitures that could be driven by confounding effects unrelated to environmental risks.

Overall, the above findings suggest that pollution plays an important role in asset divestitures. Firms are more likely to divest their most pollutive assets, and such asset divestitures are likely to be preceded by negative incidents of environmental risks, which likely trigger pressure from activists, investors and regulators. In the remainder of the analyses, we investigate the implications of such divestitures for the divested plants and for the parent companies that sell and buy those plants.

We start by studying plant-level changes in pollution levels, measured by the amount of toxic release, around the divestment of pollutive plants. In these analyses, we calculate changes in pollution levels of plants from before their divestment to after their acquisition by a different parent company, and compare them to contemporaneous changes in pollution levels of similar plants that were not divested. In difference-in-difference tests, we find no difference between the change in total toxic release at divested plants compared to plants that were not divested. The estimates are statistically indistinguishable from zero, hold in different test windows, and remain largely unchanged after the inclusion of plant, industry-by-year, and state-by-year fixed effects.

In contrast, we find that the intensity of toxic release, measured as the amount of toxic release per employee, increases at divested plants by 11-14% following their divestment (compared to plants that were not divested). These estimates continue to hold after the inclusion of similar sets of fixed effects and are statistically significant. Together, these estimates indicate that, on average, buyers of pollutive plants reduce employment levels at the acquired plants while maintaining toxic release levels similar to pre-divestment levels.

In the next set of analyses, we investigate the consequences of divestitures for the sellers. These analyses provide four main results. First, following the divestment of pollutive assets, the ESG ratings of sellers increase by roughly 22% (relative to the sample standard deviation), and the improvement is particularly strong for environmental ratings (27% relative to the sample standard deviation). Second, following divestments, the likelihood of being hit with an EPA enforcement action drops by about 6 percentage points (a large magnitude compared to a sample mean of 6 percentage points). Moreover, the costs of regulatory enforcement, including fines and cleanup costs, decline by over 70%. Third, following the divestment of pollutive assets, sellers receive on average $23.5 million more in government contracts due to eligibility criteria tied to pollution levels that the federal government imposes. Fourth, we find that the divested assets are sold to firms that have business ties with the sellers. Specifically, the buyers of divested assets tend to be firms with pre-existing supply chain relationships or joint ventures with the sellers. Furthermore, the buyers also tend to develop additional business relationships with the sellers after they acquire the divested assets.

Importantly, we show that the changes in ESG ratings, EPA enforcement actions, and government procurement contracts can be tied directly to the divestment of pollutive assets. First, these effects only follow the divestment of pollutive assets and are nonexistent following the divestment of non-pollutive assets. Second, we do not detect a change in the levels of pollution of the remaining assets of the seller following divestitures, which indicates that the effects are not driven by changes in the unsold, remaining plants.

Taken together, these findings suggest that following the divestment of polluting assets, firms enjoy several benefits, including an increase in their ESG ratings, a reduction in environmental disciplinary actions and compliance costs, and an increase in the amount of procurement contracts they receive. Nevertheless, the assets are reallocated to other industrial firms that maintain customer-supplier relations with the seller and remain connected through joint ventures. As such, our findings indicate that divestitures of pollutive assets convey various benefits to the sellers without having to give up their access to those assets.

In the analyses of the consequences of divestitures for the buyers, we find that buyers also benefit from acquiring divested assets. In particular, following the acquisition of a divested asset, acquirers experience significant increases in market share and sales growth. Our estimates suggest that acquirers' market share increases by 0.3 percentage points, a 15% growth relative to the average pre-transaction level of 2 percentage points, and their sales expand by nearly 10% relative to pre-transaction levels.

The central contribution of this article is to provide new evidence on the consequences of the reallocation of industrial pollution through the divestment of pollutive assets. Our findings suggest that the real asset market allows companies to sell off their pollutive assets, thereby improving their environmental ratings, regulatory compliance, and access to government resources, without losing access to these assets. Overall pollution levels, however, do not decline following divestitures. As such, our findings are more consistent with the "green-washing" view, suggesting that ESG rating agencies, environmental regulators, and ESG-minded investors fail to recognize that divestitures are ineffective conduits to reduce industrial pollution.

Overall, our findings extend prior research on (1) industrial pollution, (2) ESG, and (3) divestitures. The literature on industrial pollution studies its determinants, which range from legal liability (e.g., Alberini and Austin 2002, Stafford 2002, Shapira and Zingales 2017, Akey and Appel 2021) to third-party auditors (Duflo et al. 2013), reputational penalties (Karpoff, Lott, and Wehrly 2005), financial attributes (Chang et al. 2021, Xu and Kim 2022), imports and exports (Holladay 2016, Li and Zhou 2017), competition (Simon and Prince 2016), and ownership structure (Shive and Forster 2020). We add to this literature by showing that industrial firms react to scrutinized environmental risks by divesting their pollutive assets in a concerted effort to improve their ESG ratings, lower their regulatory compliance costs, and increase their access to government resources.

We also add to the growing literature on ESG (see Gillan, Koch, and Starks (2021) for a review). One strand of this literature studies the benefits that high ESG ratings provide firms (e.g., Lins, Servaes, and Tamayo 2017, Albuquerque et al. 2020, Ding et al. 2021, Hoepner et al. 2018). Another strand of this literature studies ESG monitoring and its effect on corporate ESG performance (e.g., Dimson, Karakaş, and Li 2015, Barko, Cremers, and Renneboog 2021, Akey and Appel 2019, Dyck et al. 2019, Heath et al. 2021, Naaraayanan, Sachdeva, and Sharma 2021). We contribute to this literature by showing that the monitoring of ESG-related incidents pushes firms to divest pollutive assets in an attempt to improve their ESG ratings and enjoy their potential benefits, without fundamental changes to operation and environmental pollution. As such, our evidence complements several recent studies that reveal the drawbacks of ESG ratings by showing that ratings from different agencies do not agree with one another, and do not reflect the true ESG initiatives of corporations (Chatterji et al. 2016, Gibson, Krueger, and Schmidt 2019, Dimson, Marsh, and Staunton 2020, Berg, Koelbel, and Rigobon 2020).

Lastly, our paper also contributes to the literature on divestitures. Several papers have studied the market for real assets and the resulting efficiency gains and resource allocation (e.g., Mulherin and Boone 2000, Maksimovic and Phillips 2001, Schlingemann, Stulz, and Walkling 2002, Bates 2005). Other studies have focused on divestitures that follow acquisitions as an ex-post measure of acquisition success (e.g., Kaplan and Weisbach 1992, Capron, Mitchell, and Swaminathan 2001, Maksimovic, Phillips, and Prabhala 2011, Arcot, Gantchev, and Sevilir 2020, Mavis et al. 2020). We add to this literature by documenting the important role of pollution in the divestiture market.

2 Data

2.1 Toxic Release Inventory (TRI) Data

We obtain data on plant-level toxic emissions from the EPA's Toxic Release Inventory (TRI) Program over the period 2000-2020. Section 313 of the Emergency Planning and Community Right-to-Know Act (EPCRA), which created the TRI program, requires industrial facilities to disclose the release of toxic chemicals. Toxic chemicals are defined as ones that cause one or more of the following: (a) cancer or other chronic human health effects, (b) significant adverse acute human health effects, and (c) significant adverse environmental effects.[3] The resultant list contains over 600 individually listed chemicals and chemical categories as of 2020, the last year of our data period. Reporting is mandatory if an establishment has at least 10 employees, operates in a specific list of NAICS codes, and emits one or more specified chemicals above a certain quantity threshold.

The TRI Program provides information regarding the level of each type of chemical released by a plant during a given year. It also provides plant address and NAICS industry classification code. We supplement the plant-level toxic release information from TRI with additional facility information from the National Establishment Time-Series (NETS) database using a crosswalk provided in the TRI program. The NETS database provides plant-level longitudinal data, including facility production measures such as the number of employees and the dollar amount of sales. We first extract the total toxic emissions from a plant in a given year (Xu and Kim, 2022) to capture the aggregate

[3]For more information regarding the TRI program: https://www.epa.gov/toxics-release-inventory-tri-program

impact of a plant's production activities on the environment and public health. Total emissions are then converted to log terms (*log(Release)*) as well as through IHS transformation (*IHS(Release)*). In addition, we examine a plant's toxic emissions intensity (Copeland and Taylor, 2003; Shapiro and Walker, 2018), defined as the amount of toxic release per employee (*Release/Emp*). Per-employee toxic release is also transformed in both log terms and IHS function.

We use a string-matching algorithm to link a subset of TRI establishments operated by public parent companies to the Compustat database to extract accounting information. The TRI database records the ultimate parent company name for each establishment every year, which can change over time following such incidents as ownership changes and parent company name changes. On the other hand, Compustat company information contains only the most up-to-date parent company names. To ensure matching accuracy, for each Compustat company identified by a GVKEY, we obtain its historical company names from CRSP. We remove all punctuation marks, delete corporate designators such as "corporation," "company," "inc," or "llc," standardize the most common words to a consistent format, and generate a similarity score between the deduplicated TRI parent names and Compustat/CRSP company names using a string-matching algorithm.[4] We then manually go through the matches to verify whether they are correct.

2.2 Divestitures

We collect data on divestiture transactions completed between 2000 and 2020 from the SDC M&A database. For each transaction, the SDC M&A database provides the effective date, the names of the buyer and the seller, and the percentage of stakes transferred, among other details. In cases where the buyer or the seller is recorded at the subsidiary firm level, SDC also reports the ultimate parent company's names and CUSIP identifiers. We only retain deals classified as "divestiture" or "spin-off" by SDC. We also require the deal to represent a significant transfer of control rights. In other words, the buyer must own more than 50% of the stake after the transaction. Next, we remove deals involving

[4]For instance, "United States" is simplified to "US," "Manufacturing" to "MFG," and "Internationals" to "INTL."

financial firms, either as buyers or sellers. To do so, we read through the synopsis of each individual deal and exclude deals where the buyer or the seller is a financial company, including private equity firms, banks, investment firms, funds, etc. We also exclude cases where the buyer or the seller is majority-owned by a financial firm.

Using information provided by the SDC, we identify the TRI plants being sold in divestitures and spinoffs through the following steps. To start, we flag incidences where a plant experiences a change of parent names and label the parent name before the change as the seller and the name after the change as the buyer. Parent name changes are either directly reported by the TRI, or could be detected by changes in a plant's CUSIP code.

Next, we match the buyer and seller names to those of divestiture deals from the SDC database. The matching is performed both at the subsidiary firm level as well as the ultimate parent level. In this process, we account for the scenario that TRI data may capture inaccurately the timing of ownership changes, and require the SDC deal year to fall within the [-3, 3] year window around the year of the parent name change in TRI. We use SDC's deal effective date as the official date for the ownership change.

We further consider the possibility that the TRI data may not update parent information correctly in all cases. To address this concern, for each plant in TRI, we track whether it has gone through a divestiture by matching its name or its parent's name to the target name in SDC. We also require the TRI plant to fit the target's geographical location and industry classification in SDC. For example, Westmoreland Coal acquired the Roanoke Valley Energy Facility from its joint venture partner, LG&E Energy Corp in 2006. While we do not see a change of parent name for the Roanoke valley Energy Facility in TRI, we still classify it as a divested plant.

To arrive at our final sample, which contains 719 deals, we remove plants that have been sold multiple times during the sample period. We do so because the difference-in-differences tests struggle with the classification of repeat divestiture targets as treatment vs. control plants.

Lastly, we also collect data on 77,027 divestiture transactions of non-pollutive assets over the period 2000–2020. Using these data, we compare between the effects of divesting pollutive plants and the effects of divesting non-pollutive assets.

2.3 RepRisk

RepRisk provides data on business-conduct risk by combining machine-learning and human analysis. It collects and screens data from over 100,000 public sources and various stakeholders to identify whether a firm has had an ESG risk incident. RepRisk classifies these events into 28 categories such as pollution, waste management issues, human rights abuses, occupational health issues, child labor, and discrimination in social and employment settings. It also assigns each event into one of three broad categories: "environmental", "social", or "governance."

Using these data, we define an indicator variable *Having ESG Event*, which equals one if RepRisk reports an ESG risk event for a given firm in a given year, and zero otherwise. Similarly, we also define *Having Env. Event* to be an indicator for a firm having an environment-related risk event in a year. Analogously, *Having Social, Governance Event* is an indicator variable that equals one for a firm with a social or governance issue in a given year.

2.4 EPA Enforcement Actions and Compliance Costs

In addition to toxic emissions data from the TRI program, the EPA also records government agency investigations and enforcement activities in its comprehensive Enforcement and Compliance History Online (ECHO) database. ECHO provides exact filing dates, detailed violation information, milestone dates, and final enforcement actions for each investigation initiated by the EPA or by state and local agencies. Further, it also reports the dollar amount of federal and local penalties, compliance actions, cost recovery, and supplemental environmental projects. We aggregate these items to evaluate the total legal liability and compliance costs for each case. Using these estimates, we analyze the changes in enforcement actions and compliance costs for sellers of pollutive plants.

2.5 Government Contracts

We collect federal government procurement contract data from www.usaspending.gov. This website provides detailed information on government contracts awarded to individual firms, including the recipient name, location,and contract dollar amount. We match contract recipients to Compustat firms based on company names and locations. Using these data, we construct variables measuring whether a firm receives a contract in a given year and the dollar amount of awarded contracts, and analyze the effect of divesting pollutive plants and firms' access to government contracts.

2.6 ESG Ratings

We obtain ESG ratings of U.S. public firms from the Kinder, Lydenberg, and Domini (KLD) database to empirically examine the effects of divestitures on sellers' (parent-level) ESG performance. KLD evaluates each firm along the following six categories: community, diversity, employee relations, environment, human rights, and product. For each each category, it counts the number of strengths and weaknesses for the firm. Following Cronqvist and Yu (2017), among others, we create an aggregate *CSR score* by netting the total number of strengths and the total number of weaknesses across all categories. In other words, each strength adds one point while each weakness subtracts one point from the aggregate CSR score. Similar to the RepRisk event measure, we also separately compute the net strength in the environment category and create *Environmental Score* to track firms' environmental ratings.

2.7 Supply-Chain and Joint Venture Relationships

We examine whether firms with prior business connections are more likely to offload polluting plants to each other, and whether divestitures of pollutive plants lead to future business connections. Business connections refer to supply-chain relations and joint venture partnerships. Supply-chain relations are sourced from Factset and Compustat Segment databases. Information on joint ventures is derived from SDC (see also Allen and

Phillips 2000 and Schilling 2009). As explained in Section 4.5, we compile a matched sample of acquirer-target pairs and define a pair of acquirer and target to be "operationally related" if they shared either a supply-chain connection or a joint venture connection in the past.

3 Empirical Strategy

We perform two types of analyses, one at the plant level and the other at the parent firm level. In the plant-level analysis, we examine whether a plant generates less pollutants after being sold to another firm. In the firm-level analysis, we focus on changes to buyers and sellers, investigating whether they experience changes in ESG ratings, EPA enforcement costs, access to government procurement contracts, and operating performance.

3.1 Plant-level Analysis

We compile a plant-year panel that contains all plants reported in the TRI database. The key variable of interest is *Divested* × *Post*, which equals one if a plant has been sold through a divestiture, and zero for observations related to the sold plant prior to the transaction as well as for plants that are never sold.

We estimate the following regression:

$$Y_{i,t} = \beta Divested_i \times Post_{i,t} + \alpha_i + \tau_t + \epsilon_{i,t}, \tag{1}$$

where i represents a plant and t represents a year. $Y_{i,t}$ includes total release and toxic emissions intensity. We control for plant fixed effects (α_i) and year fixed effects (τ_t). In more rigorous specifications, we also control for industry-year interactive fixed effects and state-year interactive fixed effects. These controls help rule out confounding explanations related to industry dynamics, local economic conditions, or state-level policies.

3.2 Firm-level Analysis

The firm-level analysis primarily centers around sellers. We construct a sample including all ultimate parent firms of TRI plants. For some analyses where the dependent variable is available only for public firms, we restrict the sample to publicly traded parents. We estimate the following regression:

$$Y_{f,t} = \beta Seller\,(Pollutive)_f \times Post_{f,t} + \gamma \cdot \mathbf{X}_{f,t} + \theta_f + \tau_t + \nu_{f,t}, \tag{2}$$

where f represents a parent firm and t represents a year. $Y_{f,t}$ includes ESG scores, enforcement actions, having a RepRisk event, etc. $Seller\,(Pollutive)_f$ equals one if firm f sells any pollutive plant over our sample period, and zero otherwise. $Post_{f,t}$ equals one starting from the year of the transaction. $\mathbf{X}_{f,t}$ represents an array of firm characteristics, including firm size, leverage, profitability, and tangibility. Our estimation includes firm fixed effects (θ_f) and year fixed effects (τ_t). More rigorous specifications also include industry-year fixed effects.

We use the divestiture of non-pollutive assets as a benchmark of comparison, and repeat the seller-level tests above. Specifically, we examine:

$$Y_{f,t} = \beta Seller\,(NonPollutive)_f \times Post_{f,t} + \gamma \cdot \mathbf{X}_{f,t} + \theta_f + \tau_t + \nu_{f,t}, \tag{3}$$

where $Seller\,(NonPollutive)_f$ equals one if firm f sells any non-pollutive asset over our sample period, and zero otherwise. In this analysis, we utilize a firm-year panel that includes all observations for publicly traded firms, except for ones that sold TRI plants. This filter helps remove from our control group firms experiencing the treatment effect of selling pollutive plants.

We also analyze the performance of buyers using a similar framework. The analysis includes all publicly traded firms. We evaluate the changes in market share and sales after a firm purchases a polluting plant.

$$Y_{b,t} = \beta Buyer_b \times Post_{b,t} + \gamma \cdot \mathbf{X}_{b,t} + \theta_b + \tau_t + \upsilon_{b,t}, \tag{4}$$

where b represents a firm. $Buyer_b$ is an indicator that equals one if firm b is the buyer of at least one TRI plant during our sample period, and zero otherwise.

4 Results

4.1 Univariate Analysis

Table 1 presents summary statistics for variables at the plant-level (Panel A) and firm-level (Panel B) used in the paper. Our TRI sample consists of 37,564 unique plants with 352,938 plant-year observations. At the plant level, the distribution of pollution emission is skewed. The average toxic emissions of our sample plant-year is around 58,528 pounds with the median being 1,687 pounds. On average, each plant-year hires 258 employees and generates $74 million dollars in sales revenue. In Table A.2, we tabulate the industry distribution of our sample. The vast majority of plants are located in a few manufacturing sectors known to be heavy polluters: chemical manufacturing, fabricated metal product manufacturing, primary metal manufacturing, among others.

Table 1 About Here

At the parent firm level, the average seller in our sample emit 625,496 pound of toxic chemicals, with the median being 22,479 pounds. The average firm also has an employment count of around 2,364 with the median being around 600. When combined with the non-sellers, the average firm has a market-to-book ratio of 3.17, leverage ratio of 0.39, cash-to-asset ratio of 0.21, and tangibility ratio of 0.25.

The average firm in our sample faces around a 7% probability of ESG risk incidents and 4% of environmental risk incidents. It also faces a 1% likelihood of being targeted for EPA regulatory enforcement. The associated enforcement cost is about $4 million on average. Government contracts have larger values. The average firm that is awarded those contracts has a $30 million government order per year. This distribution of the value is highly skewed, with the median being only $2.2 million.

In Table 2, we compare various characteristics of buyers and sellers of the divestiture deals in our sample. We restrict the comparison among publicly traded buyers and sellers, for whom most information is available. Interestingly, buyers are significantly smaller than sellers, either in terms of asset size and employment count, or sales and market share. These statistics suggest that the divestiture deals in our sample represent smaller firms purchasing assets from larger ones. Buyers also generate lower quantities of toxic releases than sellers and have higher environmental pillar ratings based on the KLD database. However, buyers' plants have similar toxic emissions intensity as sellers.

Table 2 About Here

4.2 Determinants of Divestitures

We begin our analyses by examining the triggers of plant divestitures. These analyses seek to shed light on the incentives underlying the divestitures of pollutive assets. Specifically, we ask the following two questions: (1) Are more pollutive plants more likely to be divested? (2) Does public attention to a firm's ESG risks push it to divest its pollutive plants?

4.2.1 Plant Emission and The Likelihood of Being Sold

To answer the first question, we utilize the plant-year panel and keep observations for a plant only up to the year of its divestiture. We retain all observations related to plants that are never divested in our sample. The key outcome variable in this analysis is $Divested_{i,t}$, an indicator for whether plant i is divested in year t. We examine the association between a plant's emission level and the likelihood of being divested. A plant's emission level is measured in two ways. First, we compute total volume of the toxic release from the plant during the current and the previous year ($[t-1, t]$), and transform this total volume in log terms. Second, we calculate the log of pollution intensity, which is the ratio of total release volume over the number of employees in the firm over $[t-1, t]$.

Panel A of Table 3 reports results from this analysis. Columns (1) through (3) present results related to total pollution (measured in log terms); Columns (4) through (6) present results related to pollution on a per-employee basis. We add control in stages, first including industry and year fixed effects, and then imposing industry-by-year interactive effects. Finally, we additionally control for state-by-year interactive effects. These fixed effects help us compare plants that operate in the same industry and state at the same time, thus removing potential confounding effects related to industry dynamics, local economic conditions, and state policies. Across all measures and specifications, past pollution yields significant, positive coefficients for the likelihood of divestiture, suggesting that more pollutive plants are more likely to be sold to another firm. The estimate in Column (3) implies that a one-standard-deviation increase in pollution volume (3.98) increases the likelihood of the plant being sold by about 0.03 percentage point ($= 0.007 \times 3.98$). This represents a 15% increase relative to the average likelihood of plant divestiture (0.19 percentage points). Asset pollution intensity generates a similar magnitude, indicating that a one-standard-deviation increase in pollution intensity is associated with about 12% increase in its divestiture likelihood.

TABLE 3 ABOUT HERE

4.2.2 ESG Risk Exposure and Asset Divestiture

We next examine whether firms divest pollutive plants when their ESG risk exposures face public scrutiny. As an initial proxy, we use the incidence of a negative ESG event as indication of public ESG exposure. Next, we focus on events specifically related to environmental risk, and test whether these events motivate firms to dissociate from plants that produce toxic emissions. We implement this analysis by regressing *Sell (Pollutive)*, an indicator variable for whether a firm sells a pollutive plant in a year, on indicators for negative ESG exposure in the current or the previous year. The regression is performed on a sample of public firms covered by RepRisk, who own at least one TRI plant in our sample period. In other words, we exclude firms that do not have a choice to sell pollutive assets. Again, we track each firm up to the year of its divestiture.

Results are presented in Panel A of Table 4. Columns (1) through (3) report results related to any ESG incidences, and Columns (4) through (6) present results related only to environmental risk events. In Columns (7) through (9), we include environmental events and non-environmental events (social and governance events) side by side, to compare their influence on firms' tendency to divest assets. Similar to Table 3, we include fixed effects in stages, starting with industry and year fixed effects, and in the end including both industry-year interactive fixed effects and state-year interactive fixed effects. Standard errors are clustered by firm.

TABLE 4 ABOUT HERE

We first document that firms facing negative ESG events are more likely to divest pollutive plants. Having an ESG risk event leads to a 0.7 percentage point greater likelihood that the firm sells a pollutive plant. Column (6) suggests that having an environmental risk event generates a much larger effect, reaching 1.3 percentage points. These are substantial magnitudes compared to the sample average of having a divestiture of 1.3 percentage points. Importantly, as we include environment-related events and non-environment-related events, we find that the effect on divestiture is concentrated on environmental issues. The coefficient on social and governance issues is small and indistinguishable from zero.

For context, we examine whether selling assets is a common response of all firms facing negative press exposure. It is possible that the negative ESG incidences simply represent inefficient operations or financial difficulties, which also force firms to sell productive assets. Under this explanation, we should expect ESG risk exposure to also be followed by divestitures of other, non-pollutive assets. However, results in Panel B suggest this is unlikely to be the case. In Columns (1) through (3), we do not find any positive association between ESG risk events and the likelihood of divesting non-pollutive assets. Results in Columns (4) through (9) indicate that having an environmental exposure event is negatively associated with future divestitures. This might be due to such exposure revealing risks embedded in firms' operations and increasing the difficulty for firms to attract buyers. In untabulated analysis, we repeat the analysis on a full sample of public firms, where we do not find any association between ESG events and divestiture likelihood of non-pollutive assets.

4.3 Changes in Pollution Around Divestitures

The findings in the previous section suggest that pollution plays an important role in driving asset divestitures. In particular, firms are more likely to divest pollutive assets than non-pollutive assets following negative incidents of environmental risks, which likely trigger pressure from activists, investors, and regulators alike. In light of these findings, a natural question that arises is whether such divestitures affect future pollution levels of the transacted plants. To answer this question, we study changes in plant-level pollution levels following their divestitures.

We examine the changes in plant-level pollution by estimating Equation (1). Table 5 presents results from this analysis. In Panel A, we examine total emission volume of a plant (in log terms), while in Panel B, we look into the log of toxic emissions intensity, measured as the amount of toxic release per employee. In each panel, we add controls in stages, first including plant and year fixed effects (Column (1)), next adding industry-year interactive fixed effects (Column (2)) to remove potential effects from industry conditions, and finally including state-year fixed effects (Columns (3) and (4)). In Column (5), we repeat the test using the IHS transformation of emission levels to address potential concerns related to the log transformation of dependent variables (Cohn, Liu, and Wardlaw, 2021).

TABLE 5 ABOUT HERE

Based on the estimates in Panel A, there are no significant differences between the change in total toxic release at the divested plant and contemporaneous changes in total toxic release at plants that were not divested. The coefficient estimates on the interaction term *Divested* × *Post* are statistically indistinguishable from zero, and remain largely unchanged across the different specifications. In contrast, the results in Panel B show that the pollution intensity of divested plants not only does not decrease, but in fact increases significantly, compared to plants that were not divested.

Together, these estimates indicate that, on average, buyers of pollutive plants reduce employment levels at the acquired plants while maintaining toxic release levels similar to pre-divestment levels. As such, they suggest that divested plants do not become "cleaner" under the new parent. Instead, they become dirtier on a per-employee basis. These results do not support the hypothesis that through divestitures, pollutive assets are transferred to new owners with higher capacity and better technology to abate emissions. They are consistent with the idea that the market for divestitures allows firms to shed dirty assets and reshape their image as low-environmental-impact companies.

In Figure 3, we trace how the pollution level of sold plants evolves around the transfer of ownership. To do so, we repeat regressions in Column (4) of Table 5, while adding separate indicators for each year in the event window. In this analysis, the "control group" includes all plants that have not been sold as of the year of observation. The event year (time 0) is absorbed as the benchmark year, so that coefficients represent the gap in the pollution level between treated and control plants relative to that year. Panel A reports coefficients for the log of total release and Panel B plots coefficient for the log of toxic emissions intensity. Consistent with the result in Table 5, we do not observe any decrease in the emission produced by sold plants. If anything, emissions intensity increases in a few years after the transaction.

4.4 Implications for Sellers

We explore firms' motives to sell pollutive assets by investigating the changes they experience following such divestitures. We provide three main analyses of the consequences of divestitures: (1) The ESG ratings of the sellers; (2) The environmental regulatory compliance costs of the sellers; and (3) The access of the sellers to government procurement contracts due to eligibility criteria tied to pollution levels. These analyses utilize the framework laid out in Equation (2). Tables 6 through 8 present these results. In each test, we not only examine the consequences of firms selling pollutive assets, but also compare such consequences to those of firms selling non-pollutive assets. This comparison is useful because it sheds light on the mechanism underlying our results. If our results are driven by divestitures allowing firms to reduce the scale of its operations and enhancing their financial resources, those effects should show up for both divestitures of pollutive and non-pollutive assets. If our findings capture firms' intention to unload dirty assets, we expect effects to be concentrated on divestitures of pollutive assets.

Table 6 presents results on the changes in ESG ratings around divestitures for the sellers. The sample includes all firms with available ESG scores from the KLD database. Panel A reports effects for sellers of pollutive assets, and Panel B examines effects for firms that sell non-pollutive assets. Within each panel, the dependent variable is a firm's overall ESG score in Columns (1) through (3), and environment-specific ratings in Columns (4) through (6). The regression specifications gradually add fixed effects and control variables. Column (1) includes firm and year fixed effects; Column (2) adds industry-year interactive fixed effects; and Column (3) adds firm characteristics, including the log of total assets, the market-to-book ratio, leverage, cash holdings, and asset tangibility.

Table 6 About Here

Results in Panel A show that sellers of pollutive plants experience a significant improvement in their ESG ratings following divestitures. Based on estimates from Column (3), sellers' overall ESG scores increase by around 0.5 relative to non-sellers, a substantial change compared to the sample mean of 0.32 and standard deviation of 2.31. Furthermore, Columns (4)–(6) show that divestiture of pollutive plants boosts the environmental scores of sellers. In Column (6), the coefficient estimate on the interaction term *Sell*×*Post* is positive and statistically significant, and its magnitude suggests that sellers' environmental scores increase by around 0.22, which represents 27% of the sample standard deviation.

In Panel B, we provide results from the same set of analysis for sellers of non-pollutive assets. The estimates suggest that these sellers do not experience an increase in their ESG scores. In fact, the coefficient estimates on the interaction term *Sell*×*Post* are negative and statistically significant. A possible interpretation of these findings is that firms are more likely to divest plants when they experience operating or financial difficulties, which tend to coincide with lower ESG ratings.

Together, these findings indicate that ESG rating agencies respond to divestitures of pollutive plants by increasing the ESG scores of the sellers. Hence, these divestitures potentially benefit the sellers through the implications of higher ESG ratings. In what follows, we consider two such potential benefits: lower regulatory compliance costs and better access to government resources.

In Table 7, we analyze changes in the likelihood of EPA violations and in sellers' compliance costs surrounding the divestitures of pollutive assets. Again, Panel A reports the results for sellers of pollutive assets, whereas Panel B reports the results for the benchmark group of sellers of non-pollutive assets.

TABLE 7 ABOUT HERE

The estimates in Panel A suggest that pollutive asset divestitures are associated with significant reductions in sellers' regulatory compliance costs. The effects are economically large. Based on Column (3), following the divestiture of a pollutive plant, the seller is roughly 6 percentage points less likely to receive an EPA enforcement action. This decline is on par with the sample standard deviation of 8 percentage points. Moreover, the estimates in Panel A further show that conditional on an EPA enforcement action, enforcement costs decrease by over 60% following the divestment of pollutive assets.

In contrast, the estimates in Panel B indicate that sellers of non-pollutive assets experience only a minimal decline in the likelihood of an EPA enforcement action, with the magnitude being around 0.3 percentage points. There is no evidence of a decline in enforcement costs.

Collectively, these results provide evidence that selling pollutive plants enables sellers to increase their compliance with environmental regulations and to reduce the costs associated with enforcement actions. Such decline in compliance burden is likely a direct result of divesting pollutive assets and is not a general byproduct of asset divestitures.

Table 7 About Here

Next, we study the allocation of Federal government procurement contracts for firms that divested pollutive assets. The difference-in-differences regression specifications compare changes in the allocation of contracts across firms that divested pollutive (non-pollutive) assets and firms that did not divest those assets.

Results are presented in Table 8. In Panel A, we examine the changes associated with divestitures of pollutive assets. We first note that such divestment does not affect the likelihood of a firm winning a government contract. Yet, conditional on firms being awarded a contract, the dollar amounts of won government contracts increase substantially. Based on column (6), which includes firm fixed effects, industry-by-year fixed effects, and firm-level control variables, contract dollar amounts increase by roughly 77%, which translates to $23.5 million given the sample average contract amount being $30.5 million. In Panel B, we repeat the above test specifications for sellers of non-pollutive assets. The estimates in Panel B do not reveal meaningful changes in the allocation or the amount of government contracts.

Collectively, these findings suggest that divestitures of pollutive firms benefit government contractors by improving their compliance with pollution-related eligibility criteria that accompany procurement contracts. Such compliance increases both the likelihood of winning government contracts and the dollar amount of won contracts. Again, such effects are unlikely to be a mechanical result of divestitures in general.

Table 8 About Here

Since divestitures are nonrandom, a possible concern is that they tend to coincide with other changes or improvements at the selling firm that can explain the changes in its ESG ratings, environmental compliance costs, and the allocation of government procurement contracts. These concerns are mitigated by our findings that these effects only follow the divestment of pollutive assets and are nonexistent following the divestment of non-pollutive assets. Still, an alternative explanation remains, suggesting that firms may sell the plants that they fail to improve, but focus their resources to reduce pollution from other plants. The various improvement we documented could simply result from the "cleaning up" of remaining plants. We evaluate this argument by examining concurrent changes in the pollution levels of the remaining plants of the seller around divestitures.

To this end, we directly track the pollution levels of sellers' undivested plants. Specifically, for all plants that did not go through a divestiture, we define an indicator variable *Peer Divestiture* × *Post*, which equals one if its parent company has divested at least one plant by the year of observation. Table 9 reports the results. Similar to Table 5, Panel A provides the results for the total amount of toxic release whereas Panel B presents the results for pollution intensity, defined as the amount of toxic release per employee.

TABLE 9 ABOUT HERE

The estimates in Table 9 indicate that the remaining (undivested) plants do not exhibit meaningful declines in toxic release. Specifically, the coefficients on the interaction term *Peer Divestiture* × *Post* are relatively small, statistically insignificant at conventional levels, and switch signs across Panels A and B. This suggests that pollution levels do not change at the remaining plants of divesting companies. These findings lend further support to the notion that firms can achieve various benefits from selling off pollutive assets without having to abate emission in their production process. In other words, agencies in both private and public sectors reward firms for asset divestitures even though such activities bear no implications for total pollution.

4.5 Business Ties Between Buyers and Sellers

The evidence thus far suggests that firms divest pollutive assets and consequently enjoy several benefits, including higher ESG ratings, lower regulatory compliance costs, and better access to government contracts. In this subsection, we investigate the existence of business ties between the selling firm and the buyer of its pollutive plants, which may provide the seller with continued access to the plants that it divested. These analyses are motivated by ample anecdotal evidence suggesting that the divestitures of pollutive assets tend to occur between operationally related firms. For example, in 2002, Genencor International Inc acquired Enzyme Bio-System Ltd from its joint venture partners, CPC International Inc and Texaco Inc. US Premium Beef acquired 71% of the shares in Farmland National Beef Packing Co (FN) from its joint venture partner Farmland Industries Inc (FI) in 2003. Others deals signal the start of cooperative relations between the buyer and the seller. For example, Outokumpu Oyj (OO) acquired the majority interest in the heat transfer business of Lennox International Inc (LI) in 2002 to form a joint venture.

Motivated by the above real-world examples, we next investigate the nature of the relationship between sellers and buyers of pollutive assets to shed light on the incentives of the buyers and on the ability of the sellers to access the divested plants and their products after the divestiture.

Specifically, in these analyses we test whether firms that share business ties with the sellers are more likely to purchase pollutive plants from the sellers. We consider two types of relationships: (1) customer-supplier relations; and (2) joint venture partnerships. These relationships may increase the likelihood of purchasing a divested pollutive asset for several reasons. First, both types of relationships imply operational and technological complementarities between the seller and the buyer. Hence, related buyers are better positioned to utilize the divested asset, and will therefore offer a higher price. Second, existing business relationships help firms during the negotiation process and promote the likelihood of a divestment agreement. Third, the existence of a business relationship facilitates the access of the seller to the plant's output even when it is operated by a different parent company, allowing the seller to maintain its current operation and production processes.

We design these analyses following the matching approach introduced by Bena and Li (2014). For each divestiture deal, we find five "pseudo buyers," who operate in the same industry as the buyer. Pseudo buyers are sampled with replacement from a list of SDC acquirers. Such acquirers have both the propensity and the capacity to purchase assets from other firms. This matching approach generates six buyer-seller pairs for each deal, including five pseudo buyers and one actual buyer for the seller. Accordingly, we code *Buyer of Divested Plants* to be one for the actual buyer, and zero for the pseudo buyers.

Next, we investigate whether each pair of firms shares an ongoing supply-chain relation at the time of the deal or has started a joint venture prior to the deal. If so, we set the indicator variable *Operationally Related* to be one for this pair of firms.

We also consider the possibility that sellers maintain their access to products or services of divested plants after the transaction by examining whether buyers are more likely to start a new business relationship with the actual buyer than with pseudo buyers after the year of the deal. This investigation helps reveal whether the divestiture indeed represents a material operational or production change for the seller, or simply reflects a change in the boundary of the firm without material operational shifts.

Table 10 reports the results from this analysis. In Column (1), we regress the indicator for the real buyer, *Buyer of Divested Plants* on the indicator for shared business relations, *Operationally Related*. The regression controls for match group fixed effects, which is an indicator for each individual divestiture transaction. This stringent set of fixed effects allows us to compare each buyer-seller pair to its matched pseudo buyer-seller pairs. These fixed effects also absorb any variation at the deal level, or broader than the deal level, including macroeconomic trends, seller characteristics, and industry dynamics.

The estimates in Table 10 suggest that operationally related firms are 46 percent more likely to purchase a pollutive plant from the seller, compared to unrelated firms. This magnitude is substantially larger than the sample average for *Buyer*, which is 0.167 (1/6) by construction.

TABLE 10 ABOUT HERE

In Column (2), we examine whether following divestitures, sellers are more likely to establish business relations with the buyer to maintain access to their divested plants. Our results are consistent with this conjecture. Our estimates suggest that sellers are around 7 percent more likely to establish a supply-chain or joint venture partnership with the buyers than with other firms. The magnitude of this estimate is economically large since the average probability of establishing new business relationships in our matched sample is slightly above 2 percent.

All in all, our findings suggest that following the divestment of polluting assets, firms enjoy several benefits, including an increase in their ESG ratings, a reduction in environmental disciplinary actions and compliance costs, and better access to government procurement contracts. Nevertheless, the assets are reallocated to other industrial firms that maintain customer-supplier relations with the seller and remain connected through joint ventures. As such, our findings indicate that divestitures of pollutive assets convey various benefits to the sellers without having to give up their access to those assets.

5 Effects on Buyers

In the final set of analyses, we seek to provide evidence on the incentives of the acquirers. Specifically, we try to answer the question: why do firms agree to purchase highly pollutive plants? To answer this question, we investigate the effects of acquiring divested pollutive assets on the buyer's revenue and market share.

We investigate this question by directly examining how buyers' sales and market shares change around the acquisition of pollutive plants. The analysis follows the same framework as described in Equation (2). The results are provided in Table 11. The estimates suggest that following a divestiture, buyers of divested plants experience a significant increase in market share and sales growth. Our estimates in Column (2) suggest that buyers' market share increases by 0.3 percentage points, a 15% growth relative to the pre-transaction level (0.02, as reported in Table 2). Column (4) further shows that after purchasing the divested plants, buyers' sales expanded by around 10% relative to pre-transaction levels.

Table 11 About Here

To corroborate these findings, we also read the merger announcements and deal synopses that accompany these divestitures. Consistent with our results, we often observe that buyers declare that the purchase of plants should significantly increase their production capacity, improve their presence in a market segment, and even open the opportunity for them to become industry leaders.

It is interesting to consider these findings in light of the statistics reported in Table 2. These statistics suggest that the buyers generally have modest market shares and generate lower sales compared to the sellers. At the same time, the buyers produce lower levels of emission and possess higher environmental ratings. This "comparative" advantage potentially allows buyers to absorb the high-pollution assets from sellers, which can boost buyers' production capacity and market share.

6 Conclusion

In this paper, we investigate the motivations behind, and implications of, divestitures of pollutive assets. We find that sellers of pollutive assets benefit from divestitures in several ways. They receive higher ESG ratings, face lower environmental compliance costs and enforcement risks, and obtain better access to government procurement contracts.

At the same time, pollution levels do not decline. Divested plants generate similar amounts of toxic release under the new owners, and even higher levels of toxic release per employee. Furthermore, plants that remain under the ownership of sellers do not experience a reduction in pollution either.

Moreover, we find suggestive evidence that sellers maintain access to the sold plants as they are more likely to sell their pollutive assets to joint-venture or supply-chain partners. After the sale, the seller and the buyer are also more likely to develop new business relations.

Combined, these findings suggest that regulators, rating agencies, and government procurement agencies reward the divestment of pollutive assets, even though these divestitures only reflect a cosmetic redrawing of the boundaries of the firm without any real effects on abatement efforts or overall pollution levels. This evidence seems more consistent with the view that the divestment of polluting assets is a "green-washing" strategy through which firms convey a false impression that they are more environmentally sound to obtain the benefits associated with a stronger environmental image. As such, our findings provide novel evidence on the role that the real asset market plays in firms' green-washing strategies.

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Figure 1. The Average Value of Pollutive Plant Divestitures

This figure reports the average deal value of divestitures involving TRI plants in each year.

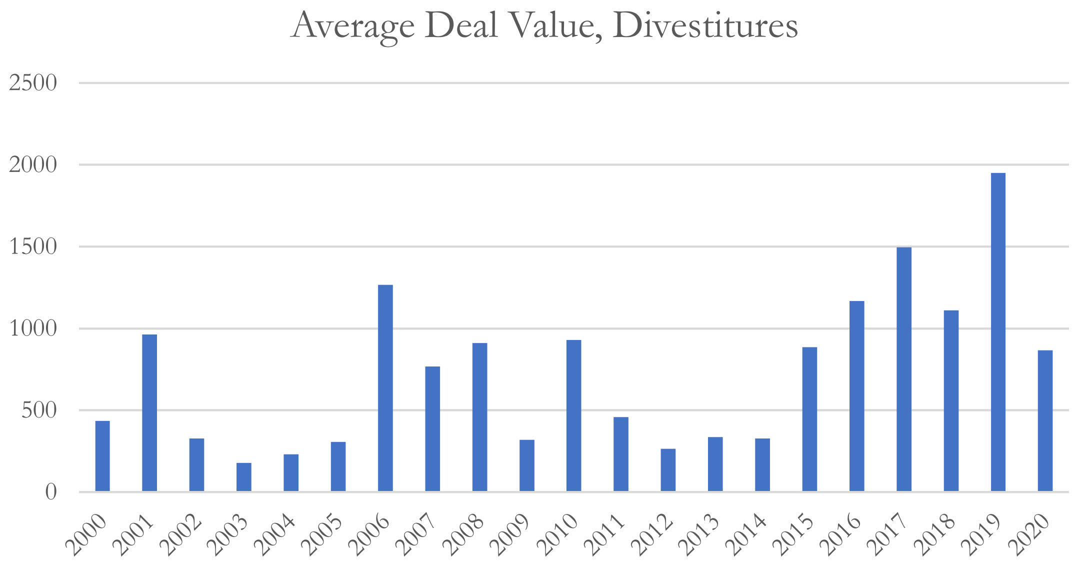
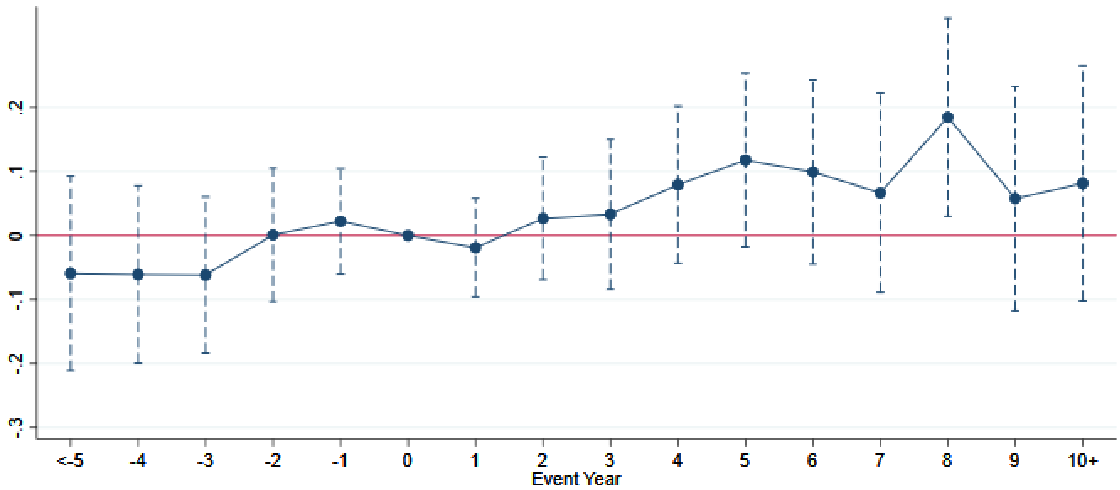


Figure 2. Google Search Volume of “Green Wash”
This figure reports the average google search volume of the phrase “green wash” in each year.

Figure 3. Changes in Plant-level Pollution Following Divestitures
This figure presents the dynamics of plant-level pollution around divestitures, measured as log of the total toxic releases in panel (a) and log of the total toxic releases divided by employment count in panel (b). Regression specification includes plant fixed effects, industry-year fixed effects, and state-year fixed effects. 95% confidence intervals are included.

(a) Log(Release)



(b) Log(Release/Emp)

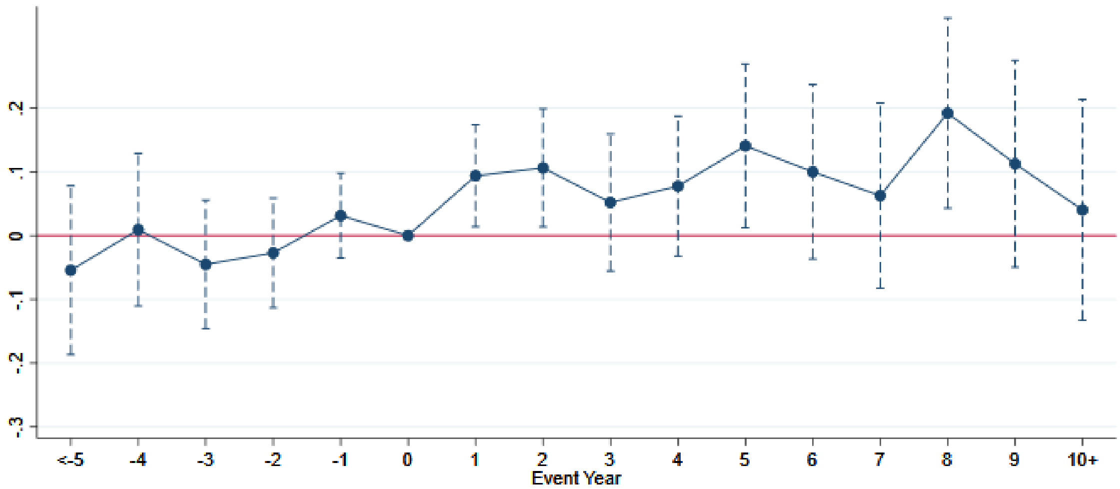


Table 1. Summary Statistics

This table presents summary statistics for variables used. Panel A presents summary statistics for the TRI plant-year panel, and Panel B presents the summary for the firm-year panel.

Panel A: Plant-Level Sample

	N	Mean	Median	SD	P25	P75
Log(Release)	352,938	6.66	7.43	4.05	3.22	9.78
Release	352,938	58,528.59	1,687.19	215,344.54	24	17,705
Log(Release/Emp)	285,242	3.23	2.97	2.86	0.24	5.40
Release/Emp	285,242	1,158.93	18.42	5,190.52	0.28	220.51
IHS(Release)	352,938	7.24	8.12	4.24	3.87	10.47
IHS(Release/Emp)	285,242	3.67	3.61	3.12	0.27	6.09
Log(Sales) (NETS)	284,538	16.74	16.81	1.77	15.67	17.91
Sales (in $M, NETS)	284,538	73.92	20	174.94	6.40	59.99
Log(Emp) (NETS)	285,242	4.59	4.62	1.48	3.69	5.63
Emp (NETS)	285,242	258.02	100	449.79	39	277

Panel B: Firm-Level Sample

	N	Mean	Median	SD	P25	P75
Log(Release)	14,326	9.16	10.02	4.36	7.00	12.30
Release	14,326	625496.30	22,479	2,037,716	1,101	220,629.90
Log(Release/Emp)	13,466	3.63	3.54	2.68	1.26	5.64
Release/Emp	13,466	898.05	33.33	3,721.17	2.52	280.69
Log(Sales) (NETS)	14,326	4.72	4.90	2.24	3.45	6.22
Sales (in $M, NETS)	14,326	790.42	132.76	2,080.41	30.45	503.95
Log(Emp) (NETS)	14,326	6.06	6.37	2.35	5.02	7.63
Emp (NETS)	14,326	2,364.07	584	5,000.88	150	2,064
CSR Score (KLD)	38,203	0.32	0.00	2.31	-1.00	1.00
Environment Score (KLD)	38,203	0.15	0.00	0.83	0.00	0.00
Have ESG Event	180,203	0.07	0	0.26	0	0
Have Env. Event	180,203	0.04	0	0.19	0	0
Have Social, Governance Event	180,203	0.07	0	0.25	0	0
Enforcement Action	182,184	0.01	0	0.08	0	0
Log(Enforcement Cost)	14,013	0.94	0	3.23	0	0
IHS(Enforcement Cost)	14,013	0.99	0	3.41	0	0
Have Contract	182,517	0.11	0	0.31	0	0
Log(Contract Amount)	20,287	11.79	12.32	4.56	10.17	14.61
IHS(Contract Amount)	20,287	12.42	13.01	4.71	10.86	15.30
Log(Assets)	184,691	5.32	5.55	2.95	3.43	7.37
M/B	168,278	3.17	1.36	6.38	1.02	2.36
Leverage	180,965	0.39	0.34	0.34	0.04	0.64
Cash Holding	184,650	0.21	0.10	0.26	0.03	0.30
Tangibility	180,154	0.25	0.12	0.28	0.02	0.40
Market Share	184,416	0.01	0.00	0.02	0.00	0.00
Log(Sales)	164,571	4.91	5.06	2.87	3.22	6.90

Table 2. Buyer and Seller Characteristics
This table presents the univariate comparison of buyers and sellers' characteristics. The sample includes all publicly traded buyers and sellers for the year before and in the year of the divestiture.

	Buyer		Seller		Difference
	Obs	Mean	Obs	Mean	(Buyer−Seller)
Log(Release)	348	11.07	373	11.70	-0.63***
Log(Release/Emp)	332	4.20	369	4.17	0.03
Log(Emp) (NETS)	348	7.03	373	7.87	-0.83***
Log(Sales) (NETS)	348	5.73	373	6.57	-0.84***
CSR Score (KLD)	276	0.22	338	0.14	0.09
Environment Score (KLD)	276	0.12	338	-0.12	0.24**
Size	499	7.96	522	8.60	-0.64***
M/B	493	1.61	514	1.53	0.09**
Leverage	499	0.42	521	0.45	-0.03***
Cash	528	0.10	542	0.08	0.02***
Tangibility	499	0.09	522	0.09	-0.00
Market Share	499	0.02	522	0.04	-0.01***
Log(Sales) (Compustat)	497	7.85	519	8.41	-0.56***

Table 3. Plant-Level Pollution and the Likelihood of Divestitures

In this table, we examine whether plants releasing more toxic chemicals are more likely to be divested by their parent firms. *Divested* is an indicator of whether a plant is divested in a given year. *Past Release* is the average level of toxic release generated by a plant over the past two years ($[t-1,t]$), while *Release/Emp* captures the average toxic emissions intensity by a plant over the past two years. Data regarding the number of employees in a plant come from NETS. The sample is a plant-year panel, including all TRI plant observations up to the year it is sold. Standard errors are clustered at the plant level. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dep. Var.: *Divested*	(1)	(2)	(3)	(4)	(5)	(6)
Past Release	0.007***	0.007***	0.007***			
	(0.002)	(0.003)	(0.003)			
Past Release/Emp				0.008**	0.008**	0.008*
				(0.004)	(0.004)	(0.004)
Year FE	Yes			Yes		
Industry FE	Yes			Yes		
Industry-Year FE		Yes	Yes		Yes	Yes
State-Year FE			Yes			Yes
Observations	270,593	270,478	270,473	217,307	217,178	217,155
R^2	0.001	0.003	0.008	0.001	0.004	0.008

Table 4. Exposure to ESG Risks and the Decision to Sell Pollutive Plants

This table examines the response of firms to ESG risk exposure. Information on ESG risk events comes from RepRisk. *Have ESG Risk Event* is a dummy variable that equals one if a firm incurs an ESG risk event in the current or the past year. *Have Env. Risk Event* equals one if a firm incurs an environment-related risk event in the current or the past year. Similarly, *Have Social, Governance Event* indicates whether a firm incurs a social or environmental-related risk event in the current or the past year. In Panel A, we examine whether firms facing ESG risk events are more likely to sell pollutive plants. The dependent variable is *Sell (Pollutive)*, an indicator is a firm divests at least one TRI plant in a given year. The sample used in this analysis is a parent firm-year panel, including all parents of TRI plants that have appeared at least once in the RepRisk database. In Panel B, we examine whether the same set of parent firms are more likely to divest other assets when facing ESG risk exposures. The dependent variable is *Sell (Non-Pollutive)*, an indicator is a firm divests other assets in a given year. Standard errors are clustered at the parent firm level. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Panel A. Parent RepRisk Events and Decision to Divest TRI Plants

Dep. Var.: *Sell (Pollutive)*	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Have RepRisk Event	0.007**	0.007**	0.007**						
	(0.003)	(0.003)	(0.003)						
Have Environment Event				0.010**	0.012***	0.013***	0.009**	0.012**	0.012**
				(0.004)	(0.005)	(0.005)	(0.004)	(0.005)	(0.005)
Have Social, Governance Event							0.002	0.001	0.001
							(0.003)	(0.003)	(0.003)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes			Yes			Yes		
Industry-Year FE		Yes	Yes		Yes	Yes		Yes	Yes
Firm Char			Yes			Yes			Yes
Observations	9,172	8,733	8,336	9,172	8,733	8,336	9,172	8,733	8,336
R-squared	0.198	0.258	0.263	0.198	0.259	0.263	0.198	0.259	0.263

Panel B. RepRisk Events and Decision to Divest Other Assets

Dep. Var.: *Sell (Non-Pollutive)*	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(8)
Have RepRisk Event	-0.014	-0.016	-0.021						
	(0.013)	(0.013)	(0.013)						
Have Environment Event				-0.016	-0.021	-0.023	-0.012	-0.015	-0.015
				(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
Have Social, Governance Event							-0.008	-0.012	-0.015
							(0.012)	(0.013)	(0.013)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes			Yes			Yes		
Industry-Year FE		Yes	Yes		Yes	Yes		Yes	Yes
Firm Char			Yes			Yes			Yes
Observations	10,179	9,771	9,375	10,179	9,771	9,375	10,179	9,771	9,375
R^2	0.741	0.761	0.768	0.741	0.762	0.768	0.741	0.762	0.768

Table 5. Changes in Pollution Following Divestitures

This table presents regression estimates for the pollution level of divested plants around the divestiture. The sample includes all TRI plants. *Divested* is an indicator of whether a plant has been divested by its parent. *Post* is an indicator for years after the transaction. *Log(Release)* is the log value of the total toxic release of a plant. *Log(Release/Emp)* captures a plant's toxic emissions intensity, which is calculated as the ratio of total toxic release over the establishment's employment (based on information from NETS). *IHS(·)* represents the IHS transformation of pollution levels. Standard errors are presented in parentheses and clustered by plant. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Panel A. Total Toxic Release of Divested Plants

Dep. Var.:	*Log(Release)*				*IHS(Release)*
	(1)	(2)	(3)	(4)	(5)
Divested×Post	0.115*	0.092	0.104	0.085	0.097
	(0.066)	(0.065)	(0.066)	(0.065)	(0.068)
Plant FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes				
Industry-Year FE		Yes		Yes	Yes
State-Year FE			Yes	Yes	Yes
R^2	0.858	0.860	0.859	0.860	0.859
Observations	316,722	316,571	316,716	316,565	316,565

Panel B. Toxic Emissions Intensity of Divested Plants

Dep. Var.:	*Log(Release/Emp)*				*IHS(Release/Emp)*
	(1)	(2)	(3)	(4)	(5)
Divested×Post	0.137**	0.114*	0.129**	0.109*	0.119*
	(0.061)	(0.061)	(0.061)	(0.061)	(0.065)
Plant FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes				
Industry-Year FE		Yes		Yes	Yes
State-Year FE			Yes	Yes	Yes
R^2	0.854	0.856	0.855	0.856	0.856
Observations	255,389	255,228	255,368	255,204	255,204

Table 6. Changes in ESG Ratings Following Divestitures

This table presents ESG Rating changes post-divestitures for sellers. The sample includes all firms covered by the KLD database. Panel A reports results related to divestitures of TRI plants. *Seller (Pollutive)* is an indicator of whether a firm sells a plant in a divestiture transaction over our sample period. Panel B reports results related to divestitures of other, non-pollutive assets. *Seller (Non-Pollutive)* is an indicator of whether a firm sells a non-pollutive asset in a divestiture transaction over our sample period. In both panels, the dependent variable of the first three columns is *Overall CSR Score*, and the dependent variable of the last three columns is *Environmental Scores*. *Post* indicates years during or after the deals. Rating data come from the KLD database. *Firm Char* includes *Log(Assets)*, *M/B*, *Leverage*, *Cash*, and *Tangibility*. Standard errors are reported in parentheses and clustered by firm. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Panel A. Divesting TRI Plants and Future ESG Rating

Dep. Var.:	*Overall CSR Scores*			*Environment Scores*		
	(1)	(2)	(3)	(4)	(5)	(6)
Seller(Pollutive)×Post	0.706***	0.492**	0.506**	0.495***	0.245**	0.221**
	(0.227)	(0.220)	(0.223)	(0.109)	(0.105)	(0.106)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes			Yes		
Industry-Year FE		Yes	Yes		Yes	Yes
Firm Char			Yes			Yes
R^2	0.602	0.629	0.631	0.488	0.537	0.542
Observations	37,402	37,281	35,154	37,402	37,281	35,154

Panel A. Divesting Other Assets and Future ESG Ratings

Dep. Var.:	*Overall CSR Scores*			*Environment Scores*		
	(1)	(2)	(3)	(4)	(5)	(6)
Seller(Non-Pollutive)×Post	-0.167***	-0.117**	-0.091	-0.079***	-0.053**	-0.051**
	(0.054)	(0.053)	(0.056)	(0.023)	(0.022)	(0.023)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes			Yes		
Industry-Year FE		Yes	Yes		Yes	Yes
Firm Char			Yes			Yes
R^2	0.601	0.629	0.631	0.485	0.536	0.541
Observations	37,402	37,281	35,154	37,402	37,281	35,154

Table 7. Changes in Environmental Compliance Costs Following Divestitures

This table presents changes in enforcement costs for sellers around the divestiture. The sample includes all public firms. Panel A reports results related to divestitures of TRI plants. *Seller (Pollutive)* is an indicator for whether a firm sells a plant in a divestiture transaction over our sample period. *Post* indicates years during or after the deals. Panel B reports results related to divestitures of other, non-pollutive assets. *Seller (Non-Pollutive)* is an indicator for whether a firm sells a non-pollutive asset in a divestiture transaction over our sample period. In both panels, *Enforcement Action* is an indicator is a firm faces an EPA enforcement action in a given year. *Log(Enforcement Cost)* is the log dollar amount of cost incurred by the firm due to the enforcement, including fines and cleanup costs. *IHS(Enf. Cost)* is the IHS transformation of enforcement cost. *Firm Char* includes *Log(Assets)*, *M/B*, *Leverage*, *Cash*, and *Tangibility*. Standard errors are clustered at the firm level. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Panel A. Divesting TRI Plants and Future Enforcement Actions

Dep. Var.:	*Enforcement Action*			*Log(Enforcement Cost)*			*IHS(Enf. Cost)*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Seller (Pollutive)×Post	-0.070***	-0.061***	-0.063***	-0.882***	-0.791***	-0.690***	-0.732***
	(0.013)	(0.013)	(0.013)	(0.204)	(0.201)	(0.201)	(0.212)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes			Yes			
Industry-Year FE		Yes	Yes		Yes	Yes	Yes
Firm Char			Yes			Yes	Yes
Observations	180,676	165,329	142,238	13,813	13,442	12,775	12,775
R^2	0.328	0.338	0.346	0.283	0.325	0.330	0.331

Panel B. Divesting Other Assets and Future Enforcement Actions

Dep. Var.:	*Enforcement Action*			*Log(Enforcement Cost)*			*IHS(Enf. Cost)*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Seller (NonPollutive)×Post	-0.003***	-0.003**	-0.003**	-0.160	-0.152	-0.134	-0.140
	(0.001)	(0.001)	(0.001)	(0.117)	(0.122)	(0.122)	(0.128)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes			Yes			
Industry-Year FE		Yes	Yes		Yes	Yes	Yes
Firm Char			Yes			Yes	Yes
Observations	180,676	165,330	142,249	13,813	13,446	12,781	12,781
R^2	0.326	0.337	0.344	0.282	0.324	0.330	0.330

Table 8. Changes in the Allocation of Government Contracts Following Divestitures

This table presents changes in the likelihood of a firm obtaining government contracts around divestitures. The sample includes all public firms. In Panel A, we examine the effect of divesting pollutive plants. *Seller (Pollutive)* is an indicator of whether a firm sells a plant in a divestiture transaction over our sample period. *Post* indicates years during or after the deals. The sample is a firm-year panel, including all firms owning a pollutive plant. In Panel B, we examine the effect of divesting non-pollutive assets. *Seller (Non-Pollutive)* is an indicator of whether a firm sells a non-pollutive asset in a divestiture transaction over our sample period. *Have Contract* is an indicator is a firm faces an EPA enforcement action in a given year. *Log(Contract Amt)* is the log dollar amount of government contracts. *IHS(Contract Amt)* is the IHS transformation of the contract dollar amount. *Firm Char* includes *Log(Assets)*, *M/B*, *Leverage*, *Cash*, and *Tangibility*. Standard errors are clustered at the firm level. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Panel A. Divesting TRI Plants and Future Government Contracts

Dep. Var.:	*Have Contract*			*Log(Contract Amt)*			*IHS(Contract Amt)*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Seller (Pollutive)×Post	-0.025	-0.030	-0.030	0.221	0.772*	0.772*	0.805*
	(0.020)	(0.020)	(0.020)	(0.390)	(0.421)	(0.421)	(0.431)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes			Yes			
Industry-Year FE		Yes	Yes		Yes	Yes	Yes
Firm Char			Yes			Yes	Yes
Observations	180,999	171,705	171,705	19,589	18,359	18,359	18,359
R^2	0.688	0.702	0.702	0.571	0.616	0.616	0.607

Panel B. Divesting Other Assets and Future Government Contracts

Dep. Var.:	*Have Contract*			*Log(Contract Amt)*			*IHS(Contract Amt)*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Seller (Non-Pollutive)×Post	0.006	0.001	0.001	-0.083	-0.202	-0.202	-0.206
	(0.004)	(0.004)	(0.004)	(0.149)	(0.160)	(0.160)	(0.166)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes			Yes			
Industry-Year FE		Yes	Yes		Yes	Yes	Yes
Firm Char			Yes			Yes	Yes
Observations	180,661	171,502	171,502	19,547	18,338	18,338	18,338
R^2	0.688	0.701	0.701	0.571	0.616	0.616	0.607

Table 9. Pollution Levels at Remaining Plants Following Divestitures

This table presents regression estimates for the pollution level of remaining (non-divested) plants. *Peer Divestiture* is an indicator for whether a plant's parent is a seller in a divestiture deal over our sample period. *Post* indicates years during and after the divestiture deal. *Log(Release)* is the log value of total toxic release of a plant. *Log(Release/Emp)* captures a plant's toxic emissions intensity, which is calculated as the ratio of total toxic release over the establishment's employment (based on information from NETS). *IHS* represents the IHS transformation of pollution levels. Standard errors are presented in parentheses and clustered by plant. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Panel A. Total Toxic Release of Sellers' Remaining Plants

Dep. Var.:	*Log(Release)*				*IHS(Release)*
	(1)	(2)	(3)	(4)	(5)
Peer Divestiture×*Post*	-0.071	-0.071	-0.073*	-0.068	-0.064
	(0.044)	(0.046)	(0.044)	(0.046)	(0.048)
Plant FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes				
Industry-Year FE		Yes		Yes	Yes
State-Year FE			Yes	Yes	Yes
R^2	0.857	0.859	0.858	0.859	0.858
Observations	306,793	306,659	306,787	306,653	306,653

Panel B. Toxic Emissions Intensity of Sellers' Remaining Plants

Dep. Var.:	*Log(Release/Emp)*				*IHS(Release/Emp)*
	(1)	(2)	(3)	(4)	(5)
Peer Divestiture×*Post*	0.048	0.032	0.048	0.036	0.032
	(0.036)	(0.036)	(0.036)	(0.037)	(0.040)
Plant FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes				
Industry-Year FE		Yes		Yes	Yes
State-Year FE			Yes	Yes	Yes
R^2	0.854	0.855	0.854	0.855	0.856
Observations	247,392	247,242	247,371	247,218	247,218

Table 10. Business Ties between Buyers and Sellers of Pollutive Assets
This table reports results regarding whether the buyer and seller of a divestiture share operational relations, such as supply-chain or joint-venture partners. In Column (1), we examine whether firms that shared operational relationships with the seller in the past are more likely to become buy the divested plants from the seller. *Operationally Related* is an indicator for whether a firm is a supply-chain or joint venture partner with the seller in the past. *Buyer of Divested Plants* is an indicator for whether a firm purchases a divested plant from the seller. In Column (2), we examine whether firms are more likely to develop new supply-chain or joint venture relations after the divestiture. For each divestiture deal, we match the buyer with five randomly chosen acquirers in the SDC universe in the same industry. Each matched acquirer is considered a potential buyer. The analysis utilizes a matched-pair sample, wherein each observation is a seller-potential buyer pair. As such, each deal has six observations (a matched group), consisting of the actual buyer-seller pair and five potential buyer-seller pairs. Regressions include matched group fixed effects. Standard errors are double clustered by matched group and deal year. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dep. Var.:	(1) *Buyer of Divested Plants*	(2) *Develop New Relationship*
Operationally Related	0.456***	
	(0.062)	
Buyer of Divested Plants		0.071***
		(0.013)
Matched Group FE	Yes	Yes
Observations	2,880	2,880
R^2	0.020	0.233

Table 11. The Performance of Buyers Following Divestitures

This table presents operating performance changes post-divestitures for buyers. The sample is a firm-year panel, including all public firms in Compustat Universe, excluding firms in the financial industries. *Buyer* is a dummy variable that equals one if a firm purchases a plant via a divestiture transaction over our sample period, and zero otherwise. *Post* is an indicator for years during and after the transaction. Standard errors are clustered at the firm level. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dep. Var.:	*Market Share*		*Log(Sales)*	
	(1)	(2)	(3)	(4)
Buyer×*Post*	0.003***	0.003***	0.066	0.100**
	(0.001)	(0.001)	(0.046)	(0.048)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes		Yes	
Industry-Year FE		Yes		Yes
R^2	0.923	0.931	0.929	0.931
Observations	182,833	182,680	162,889	162,764

Table A.1. Variable Definition

Panel A: Plant-Level Variable

Log(Release)	The natural log of one plus total toxic release amount
Release	The amount of total toxic releases
Log(Release/Emp)	The natural log of one plus total toxic release amount divided by the number of employees
Release/Emp	The amount of total toxic releases divided by the number of employees
IHS(Release)	The IHS transformation of total toxic release amount
IHS(Release/Emp)	The IHS transformation of total toxic release amount divided by the number of employees
Log(Sales) (NETS)	The natural log of one plus sales dollar amount based on NETS
Sales (in $M, NETS)	The total sales dollar amount based on NETS
Log(Emp) (NETS)	The natural log of one plus the number of employees based on NETS
Emp (NETS)	The number of employees based on NETS

Panel B: Firm-Level Variable

Log(Release)	The natural log of one plus total toxic release amount
Release	The total amount of toxic releases
Log(Release/Emp)	The natural log of one plus total toxic release amount divided by the number of employees
Release/Emp	The total amount of toxic releases divided by the number of employees
Log(Sales) (NETS)	The natural log of one plus sales dollar amount based on NETS
Sales (in $M, NETS)	The total sales dollar amount based on NETS
Log(Emp) (NETS)	The natural log of one plus the number of employees based on NETS
Emp (NETS)	The number of employees based on NETS
CSR Score (KLD)	The aggregate strength and concern counts across six dimensions in the KLD data set
Environment Score (KLD)	The strength and concern counts for the environmental dimension in the KLD data set
Log(Assets)	The natural log of one plus total assets
M/B	(at-ceq+csho*prcc$_f$)/at
Leverage	(dlc+dltt)/(dlc+dltt+ceq)
Cash Holding	Cash/at
Tangibility	PPENT/at
Market Share	The percentage of sales (Compustat) within all public firms in the same NAICS3-year
Log(Sales)	The natural log of one plus sales (Compustat)
Have ESG Event	An indicator of a firm having an ESG risk event based on RepRisk
Have Env. Event	An indicator of a firm having an environmental risk event based on RepRisk
Enforcement Action	An indicator of a firm experiencing a regulatory enforcement event
Log(Enforcement Cost)	The natural log of one plus the total regulatory enforcement costs
IHS(Enforcement Cost)	The IHS transformation of the total regulatory enforcement costs
Enforcement Cost (in $M)	The total dollar amount of regulatory enforcement costs
Have Contract	An indicator of a firm being awarded a government contract
Log(Contract Amount)	The natural log of one plus the total dollar amount of government contract
IHS(Contract Amount)	The IHS transformation of the total dollar amount of government contract
Contract Amount (in $M)	The total dollar amount of government contract
Operationally Related	An indicator of a firm being a supply-chain or join venture partner with the seller in the past
Develop New Relationship	An indicator of a firm developing new supply-chain or join venture relation with the seller

Table A.2. Industry Composition

This table reports the three-digit NAICS3 code for our sample plants. Industries with fewer than 100 observations are omitted

NAICS3	Industry	Observations
325	Chemical Manufacturing	52,652
332	Fabricated Metal Product Manufacturing	45,464
331	Primary Metal Manufacturing	24,726
336	Transportation Equipment Manufacturing	23,468
311	Food Manufacturing	19,917
326	Plastics and Rubber Products Manufacturing	18,638
327	Nonmetallic Mineral Product Manufacturing	18,263
333	Machinery Manufacturing	17,028
424	Merchant Wholesalers, Nondurable Goods	14,938
334	Computer and Electronic Product Manufacturing	14,048
221	Utilities	10,202
335	Electrical Equipment, Appliance, and Component Manufacturing	9,308
324	Petroleum and Coal Products Manufacturing	7,961
322	Paper Manufacturing	6,523
321	Wood Product Manufacturing	6,334
339	Miscellaneous Manufacturing	5,884
928	National Security and International Affairs	4,752
562	Waste Management and Remediation Services	3,856
337	Furniture and Related Product Manufacturing	3,777
323	Printing and Related Support Activities	2,132
212	Mining (except Oil and Gas)	2,055
313	Textile Mills	1,958
312	Beverage and Tobacco Product Manufacturing	1,081
922	Justice, Public Order, and Safety Activities	801
316	Leather and Allied Product Manufacturing	481
314	Textile Product Mills	466
541	Professional, Scientific, and Technical Services	296
423	Merchant Wholesalers, Durable Goods	272
924	Administration of Environmental Quality Programs	239
112	Animal Production and Aquaculture	210
493	Warehousing and Storage	144
811	Repair and Maintenance	140
921	Executive, Legislative, and Other General Government Support	131
211	Oil and Gas Extraction	114