Are native plants green?

Assessing environmental performances of locally-owned facilities

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Abstract

We study the impact of corporate ownership and community conditions on firm environmental pollution. While the existing literature often thinks of environmental pollution as a unitary construct, we emphasize the distinction between toxic emissions, which have immediate but locally bounded impact, and greenhouse gas (GHG) emissions which have gradual but global impact, producing climate change. Using a facility-level panel of all manufacturing facilities in the US from 2010-2018, and leveraging within-facility changes in ownership status, we show that locally owned firms have lower levels of toxic emissions, but they are also less likely to report GHG emissions, and have higher levels of such emissions when they do report them, with these effects being stronger where the owner is not only headquartered locally, but has operations limited to that state. Our study suggests that while the pressures of local embeddedness may drive firms to be more environmentally responsible towards their local community, they also make firms more indifferent to their global environmental impact.

Keywords: environmental performance, ownership, toxic emissions, greenhouse gas, climate change, sustainability

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Introduction

Recent years have seen a growing scholarly interest in understanding what drives pollution or firm environmental performance more generally (Hart, 1995; Hoffman, 1999; King and Lenox, 2002; Bansal and Roth, 2000; Dowell and Muthulingam, 2017). Research has examined multiple factors that impact a firm's environmental sustainability performance, including (threat of) public regulation (Fremeth and Myles, 2014; Wang, Wijen, and Heugens, 2017; Kim and Zhou, 2019), market competition (Delmas, Russo, and Montes-Sancho, 2007; Duanmu, Bu, and Pittman, 2018), internal stakeholders (Delmas and Toffel, 2008; Berrone and Gomez-Mejia, 2009), collective governance arrangements among industry peers (Delmas and Montes-Sancho, 2010), as well as pressures from external stakeholders such as media (Bansal and Clelland, 2004), activists (Lenox and Eesley, 2009), and third-party rating agencies (Chatterji and Toffel, 2010). One important stream of this work thinks about the effects of ownership on firm environmental performance (Darnall and Edwards Jr., 2006; Berchicci, Dowell, and King, 2012; Walls, Berrone, and Phan, 2012; Sampson and Zhou, 2018), both in terms of foreign ownership (King and Shaver, 2001; Li and Zhou, 2017) and local ownership (Kassinis and Vafeas, 2002, 2006; Berrone, Cruz, Gomez-Mejia, and Larraza-Kintana, 2010; Grant, Trautner, Downey, and Thiebaud, 2010; Kim, Wan, Wang, and Yang, 2019).

While this stream of work suggests that locally owned firms may be less polluting and more environmentally responsible, either because they are embedded in the local communities and therefore care about the community (Kim et al, 2019), or because they are more susceptible to pressures from local stakeholders (Kassinis and Vafeas, 2002, 2006; Berrone et al, 2010), this argument ignores the diverse ways in which firms can pollute, not all of which are limited to local externalities. There are in fact many different types of pollution, and some forms of pollution may produce (negative) global externalities (Cole and Elliott, 2003; Bowen, Bansal, and Slawinski, 2018), such as carbon emissions that lead to climate change. Further, the factors that decrease one form of pollution may not decrease (or may even increase) the other. So, while local firms may be more responsive when it comes to the types of pollutions that have purely local externalities, that does not tell us how they do for pollutants with global externalities.

In this study, we examine the role of local ownership on firm environmental performance, distinguishing between pollutants that generate local externalities and pollutants that generate global externalities. Consistent with prior work, we predict that local owners will perform better on reducing negative local externalities (Kassinis and Vafeas, 2002, 2006; Berrone et al, 2010; Grant, Trautner, Downey, and Thiebaud, 2010; Kim et al, 2019), but at the same time, we expect them to produce more negative global externalities. This may be because managers have limited attention (Ocasio, 1997), so that the more attention is spent on pollutants with local externalities, for example, the less attention is spent on pollutants with global externalities. Moreover, the goodwill locally owned firms generate in keeping down pollutants with local externalities may serve as insurance and protect them (Godfrey, 2005; McDonnell, King and Soule, 2015), allowing them to then increase the level of pollutants with global externalities. This suggests a moral hazard problem where firms are doing good things for the local community but harming the global communities (Luo, Kaul, and Seo, 2018; Seo, Kaul, and Luo, 2020). We further expect these effects will be stronger with higher levels of local embeddedness, that is, when local owners operate only in the local community (as opposed to having operations elsewhere in the country or in the world), the effect of local ownership on reducing pollutants with local externalities while enhancing pollutants with global externalities would be most salient.

We examine the simultaneous effects of local ownership on firm environmental performance on two pollutants with varying externalities in a sample of 14,369 U.S. manufacturing facilities from 2010 to 2018. Specifically, we combine facility-level data on toxic emission from EPA's Toxic Release Inventory (TRI), as well as on greenhouse gas reporting and emission from the Greenhouse Gas Reporting Program (GHGRP), while also tracking ownership changes of these facilities throughout the sample period in the Dun and Bradstreet database (D&B). Consistent with our predictions, we find that a change in ownership of a facility from non-local owner to local owner is associated with both a decrease in toxic emissions, which have immediate but locally bounded impact, as well as an increase in greenhouse gas emissions—which have gradual but global impact, producing climate change—coupled with a decrease in (quasi-voluntary) greenhouse gas reporting. These effects are stronger when the new local owner operates purely locally, as opposed to locally headquartered owners with operations in other parts of the country or in other countries. Supplementary analyses confirm that these changes in ownership are not themselves triggered by pollution levels, ruling out concerns about reverse causality, and that switching to local ownership is associated with increasing investment in toxic emission source reduction technologies, consistent with our proposed mechanisms. Supplementary analyses also show that decreases in toxic release is associated with a reduced probability of GHG reporting, and that this effect is stronger for locally owned facilities, suggesting that the twin effects of local ownership in our main findings may be related to each other.

We contribute to the literature on corporate sustainability and environmental performance. In particular, while most work has tended to club all kinds of environmental pollution together, we highlight the need to distinguish between pollution with local externalities and global externalities and consider both together while evaluating firm environmental performance. We also highlight the role of ownership – particularly, local ownership – and provide a more nuanced picture of it, both in the sense that local owners may not always be more environmentally friendly—they are only so when it comes to reducing local externalities—but also in the sense that local embeddedness enhances the effects of local ownership for pollution. This work also has implications for policies of environmental regulations. It shows that distinguishing between these two types of pollution is critical, as we wrestle with the existential threat of climate change, and seek to understand the policies and strategies that will best help us keep firms' carbon emissions at sustainable levels. Ironically, it suggests that it may be more important to regulate global externalities than to regulate local externalities, as local externalities may be handled by pressure from local stakeholders, while global externalities are not. This is, of course, the opposite of what we actually do in the US.

Theoretical development and hypothesis

Local ownership and local externalities

As mentioned, we focus on the effect of local ownership on firm environmental performance and think of local facilities as those where the decision makers who control the activities of the firm are located in the same community.[1] We expect local owners to be more concerned about local externalities than nonlocal owners. First, the local owner may directly internalize negative local externalities produced by the facility, such as detrimental impact on health (Liu, Chen, Sera and Vicedo-Cabrera, 2019) and property value (Currie, Davis, Greenstone and Walker, 2015), and therefore be incentivized to reduce such externalities (Kim et al, 2019). Since they are physically closer to a polluting facility than nonlocal owners, these local owners may be affected, to a much greater degree, by toxic pollutants emitted by the facility, leading them to be more willing than

[1] We use the term local ownership throughout the paper, consistent with the literature, but it's really about local governance. Empirically, and as discussed later, we measure local ownership by whether the facility's ultimate owner is headquartered in the same state as the facility.

nonlocal owners to invest in technologies to reduce such pollution. Conversely, the literature on environmental inequality maintains that minorities are more likely to live near environmental hazards, precisely because business executives are nonlocal to minority communities and do not care about the welfare of these communities (Grant et al, 2010; Kalnins and Dowell, 2017).

Second, besides direct internalization of negative externalities, these local owners may care more about their prestige and standing in the community than nonlocal owners. The local owners are shown to participate more actively in civic affairs and contribute greatly to welfare issues such as health, housing, sanitation, incomes, education, and recreation (Brunell, 2006; Mills and Ulmer, 1946), and this is because the relationships among business leaders in a community frequently constitute an informal social network through which community activities are initiated. Managers seeking to establish and maintain their prestige in this social network may either engage in corporate philanthropy, giving to the orchestra, art museums, and other local nonprofits (Marquis, Glynn, and Davis, 2007; Marquis and Lee, 2013; Tilcsik and Marquis, 2013; Marquis and Tilcsik, 2016; Seo, Luo, and Kaul, 2020), or they may strive to reduce negative externalities imposed on the local community through their facilities' environmental pollution (Berrone et al, 2010; Kim et al, 2019).

Third, these local owners may also be more susceptible to pressures from local stakeholders than nonlocal owners. Research has shown that local community pressures – oftentimes through organizing environmental groups and filing citizens' lawsuits (Florida and Davison, 2001) – have a significant influence on firms' environmental programs (Kassinis and Vafeas, 2006), including the adoption of recycling and other reverse-logistics programs (Alvarez-Gil, Berrone, Husillos and Lado, 2007). Hence, environmentally proactive firms perceive the local community as the main vehicle of influence (Henriques and Sadorsky, 1996, 1999). Community pressures at specific and locally owned plants are more salient and concrete, where information on pollution is more readily available and local press may pay more attention to the negative impact these specific plants exert on the local communities (Henriques and Sadorsky, 1996), than at the national level, where environmental demands are often more abstract, aimed at regulation of industries.

Consistent with prior literature, we maintain that local owners have a greater incentive than nonlocal owners to reduce pollution at their facilities because the former, to a greater degree, internalize the harm of pollution due to emissions of nearby facilities, care about the benefit of social prestige from acting responsibly in a local community, and are more susceptible to pressures from local stakeholders. We therefore predict:

H1 (Baseline): Local ownership is negatively associated with toxic emissions.

Local ownership and global externalities

The discussion so far focuses on pollutions that are primarily local, and assumes the only people affected by these negative externalities are people in the local communities. However, there are other pollutants that are global problems, which may spread beyond the local communities and impact the entire country or the world. Our core argument in the paper is that these will be viewed very differently by the local community and treated very differently by local owners.

Unlike local externalities, global externalities affect everyone, and hence they are likely to get less attention from the local community, both because they may not immediately impact the local community in a clearly observable way, and because the local firm's actions are a small subset of the overall problem, creating a collective action problem. On one hand, even if the local community were to put pressure on firms in its local catchment area to limit the production of a negative global externality, the marginal effect of that action on the level of that externality would be small, unless all other communities in the world took similar actions. On the other hand, if other communities in the world are successfully cutting back negative global externalities, the local community may be well served by freeriding, and allowing its plants to pollute, because the marginal cost of increasing global pollution will be small for the local community, whereas the benefits of increased production will be large (Rugman and Verbeke, 1998). The impact of these global externalities may also be unevenly distributed. In fact, the worse impact of global externalities may be felt by people far away from the local community, whose welfare may be a matter of indifference to the local community. For example, increasing climate change may lead to worse wildfires in the Bay area of California, but that may not matter to local communities in Idaho. All of these suggest a classic collective action problem, where every community has the incentive to freeride in dealing with problems involving global externalities (Bowen et al, 2018).

Given these differences, local owners may behave very differently when it comes to global externalities than local externalities. If local communities do not care about global pollution in the same way as they care about local pollution, then the arguments leading up to H1 would not apply for global pollution. In other words, global externalities won't be exclusively or differentially impacting the local community such that the corporate executives who live nearby won't directly internalize the harm of pollution (any more than executives living elsewhere), and the local communities won't care to reward firms with social prestige for good behaviors or pressure them for bad behaviors. In fact, institutional pressure for reducing pollutants with global externalities may only come through large, national, or international environmental groups such as Greenpeace, rather than from local activists. Hence, there is no reason to think that local owners will care more about global externalities than nonlocal owners, and there should not be any positive difference between them in terms of global pollutants such as greenhouse gas emissions.

Moreover, there may be reasons to think that local owners may care less about pollutants with global externalities. Given that we expect local owners to care more about local pollution, they will logically care less about global pollution, for two primary reasons. First, firms have limited resources and attention to put into reducing different types of externalities (Ocasio, 1997), so to the extent that the local firms are more focused on local externalities, such focus may come at the cost of their efforts in reducing negative global externalities, assuming the two are substitutes. So, global pollution wouldn't be that much of a priority for top managers, and they may pay it less attention, lacking the bandwidth to spend on it. Given the choice between investing in local versus global, managers of locally owned firms will see greater rewards in terms of prestige from investments in reducing local externalities, and are therefore more likely to choose to focus on technologies that reduce local externalities rather than global externalities.

Second, even if firms don't have to make a tradeoff, the mere fact that they are now protected because the local communities think well of them means that they can always selectively point to their superior record in toxic emission reduction (Lyon and Maxwell, 2011; Hawn and Ioannou, 2016; Marquis, Toffel, and Zhou, 2016). The very protection and prestige they get from reducing local pollution may serve as protection for global pollution (Godfrey, 2005; McDonnell et al., 2015), creating a moral hazard problem (Luo, Kaul, and Seo, 2018; Seo, Kaul, and Luo, 2020). Knowing that they are less likely to be punished for producing global externalities, as a result of their local reputation, these firms are likely to invest less in reducing global externalities. Bringing these arguments together, we hypothesize that locally owned firms will behave less responsibly in dealing with negative global externalities such as GHG. As GHG reporting is quasi-voluntary[2], we think of GHG performance in two ways: both in that local ownership is associated with higher levels of

[2] Reporting to GHGRP is required for facilities that emit at least 25,000 CO2e tonnes, although, as discussed later, EPA's Facility Level Information on GreenHouse gases Tool (FLIGHT) shows that close to 100 manufacturing facilities between 2013 and 2018 that are required to report do not report. Facilities below the threshold may choose to report voluntarily.

GHG emission, and that if some of these facilitates is not performing well in GHG, it may make them less likely to disclose GHG in the first place. Hence:

H2a: Local ownership is negatively associated with greenhouse gas reporting.

H2b: Local ownership is positively associated with greenhouse gas emissions.

Moderating conditions

We think these results will be moderated by local embeddedness. On one hand, the more locally embedded the firm is, the stronger the mechanisms through which local ownership reduces negative local externalities will be. Thus, managers in these locally embedded firms are more likely to internalize local community outcomes, because all senior managers will be part of the community. Locally embedded firms may care more about conforming to local norms because they rely entirely on the focal community for prestige, and because high geographic concentration increases the ties between the community and the firm (Berrone et al., 2010). And locally embedded managers will pay more attention to actions by local activists, and do not need to care about activists from other communities. For these reasons, the result on local pollution will be stronger in facilities with high levels of local embeddedness. Hence,

H3a: The more locally embedded the facility is, the stronger the negative association between local ownership and toxic emissions.

For similar reasons, the effect of localness for GHG (negative for GHG reporting and positive for GHG releases) will be stronger in facilities with high levels of local embeddedness. Locally owned firms that are less locally embedded and have presence outside of the local area may be more concerned about global externalities because some of the managers are located outside. For example, a locally headquartered firm that has operations across multiple countries would have managers who live outside of this community, and hence do not care about the local toxic emissions but may still care about global externalities. Similarly, such managers would also be more concerned about prestige in other communities. Even for managers located in the headquarters, they would be concerned about maintaining their prestige and reputation in a larger and more widespread community, for example, among their industry peers in other locations and countries. Multinational corporations (MNCs) might face pressures from national and international NGOs and stakeholders outside of their immediate community, and thus may feel the need to respond to these stakeholders while being less protected by the local reputation (Kostova and Zaheer, 1999). For all these reasons the result on global pollutant will be stronger in facilities with high levels of local embeddedness. Hence, we hypothesize:

H3b: The more locally embedded the facility is, the stronger the negative association between local ownership and greenhouse gas reporting.

H3c: The more locally embedded the facility is, the stronger the positive association between local ownership and greenhouse gas emissions.

Data and Methods

Data and Variables

Testing our hypotheses requires a longitudinal dataset that includes facility-level environmental performance for pollutants with varying externalities, as well as tracking ownership information over the sample period. For environmental performance measures, we bring together four databases, all publicly available from the U.S. Environmental Protection Agency (EPA) but separately administered.[3] Following prior literature (Natan and Miller, 1998; Grant et al 2004; King and Lenox,

[3] We thank Dr. Sydnie Lieb, former EPA Environmental Protection Specialist, for helping us understand these databases.

2000; Kim et al 2019), we use the Toxic Release Inventory (TRI)—which covers facilities in manufacturing industries (two-digit SIC codes 20-39) employing 10 or more people and processing, using, or storing more than a threshold amount of over 600 toxic chemicals—to gather information on toxic emission that generates negative local externalities. We collect information on greenhouse gas emission as a pollutant that generates negative global externalities and reporting behavior – given that GHG reporting is currently not administered as strictly as the TRI – through the Greenhouse Gas Reporting Program (GHGRP), which started only recently to gather facility-level GHGs releases in the US (Dowell et al, 2020). We also collect data on facility-level compliance and enforcement information from the Enforcement and Compliance History Online (ECHO) database, as well as data on clean technologies installation from the Pollution Prevention (P2) database. We merge these separate databases using a unique facility-identification number obtained from EPA's Facility Registry Services (FRS). We start the dataset in 2010, the year when the EPA launched the GHGRP, and ends in 2018, the latest year for which the EPA data was available at the time of data collection.

For ownership information, we hand-collected Dun and Bradstreet (D&B) numbers for 25,716 unique facilities in the merged EPA database, using a facility's name, physical address and parent's information. We further gather facility-level information, such as owners, sales and the number of employees, from D&B Historical Data File. As D&B Historical Data File often misses information, especially a facility's foreign owners, we complement the D&B Historical Data by using D&B Hoovers, Mergent Intellect and news articles. Our final sample consists of 98,958 facility-year observations of 14,369 facilities, covering facilities in 83 manufacturing industries (at the four-digit NAICS level) and located in 50 US states, DC, and Puerto Rico.

Dependent variables

We use three dependent variables to test our hypotheses. We measure a facility's local pollution as its *Toxic Releases* in a given year, calculated as the natural logarithm of toxic chemicals released (King, Shaver, 2001; Kim et al, 2019). Similarly, we measure a facility's greenhouse gas emissions in a given year, as its *GHG Releases*, using natural logarithms of GHGs released (Dowell et al, 2020). Given that disclosure of greenhouse gas emission is not random[4], whether a facility chooses to report the GHG emission is itself an also outcome of interest, and hence we code GHG reporting as 1 if the facility has information in the GHGRP for a given year and 0 otherwise.

Independent variables

We measure *Local* as 1 if the facility's ultimate owner is located in the same community as the facility in a given year and 0 otherwise. We register the highest-level parent within a corporate hierarchy as owner, with whom authority ultimately rests (Burnell, 2006). Our definition of a local community is state, fitting for the scope of bounded negative externalities for local pollutants (Luo, Kaul, and Seo, 2018). While 75% of damage is likely to happen within 300 km, toxic emissions may cause damage to people who live as far as 1,000 km from the emission source (Goodkind, Tessum, Coggins, Hill and Marshall, 2019), making states the relevant catchment area. In robustness analysis reported in Appendix 4-1, we calculate the physical distance between a facility and its parent and use the distance

[4] According to the GHGRP's Facility Level Information on GreenHouse gases Tool (FLIGHT), more than 100 establishments in the manufacturing sector discontinued reporting their GHGs emissions without any valid reason between 2013 and 2018. Additionally, facilities that do not meet the requirements of reporting still submit their GHG emissions. For example, facilities under NAICS 3272 (Glass Production), NAICS 3223 (Paper and Pulp Production) and NAICS 3222 (Converted Paper Production) are required to submit only when their emissions exceed 25,000 metric ton per year. Among 344 facilities that report their GHGs operating in these industries, 30 facilities do not meet the threshold but still report their emissions over the sample period.

threshold of 150 miles used in the prior work (Kim et al, 2019) to define local ownership and found consistent results.

Given that our identification comes from within-facility changes in ownership status in the regression, we discuss the nature of such changes in our sample. First, a change of *Local* from 0 to 1 indicates that a non-locally owned facility was acquired by or merged with a locally headquartered owner in the given year. Such changes could happen in a number of ways: among 14,369 facilities in our final sample, 365 facilities (2.5%) were acquired by local owners (from non-local owners) during our sample period, 1264 facilities (8.8%) were sold by local owners (to non-local owners), and 171 facilities (1.2%) have experienced local ownership changes in both directions (to and from local owners) during the sample period. In supplementary analyses reported in Table 8 and discussed later, we also examine how the directionality of the change is associated with pollution. Second, we list in Appendix 1 top 15 states and sectors where facilities with local ownership changes operate, reporting both the number of facilities in each state/sector that have experienced local ownership changes and the percentage of those facilities in each state/sector. The table suggests that ownership changes are well distributed across states or sectors.

Local embeddedness

To test a moderating role of local embeddedness, we split up *Local* into two binary variables, based on whether the local owner has operations outside of its headquartered state. Specifically, *Local_only* is coded 1 if a facility's local owner has operations only in its headquartered state and 0 otherwise. Local owners that own facilities only in their local community are expected to be more embedded in the community since they are heavily dependent on the community for critical resources and have no other communities to be concerned about (Brunell, 2006; Berrone et al 2010). Moreover, *Local_beyond* is coded 1 if a facility's local owner has operations beyond its headquartered state, either in other US states or in other countries. Operating facilities in places beyond its local community, such owners would seek for location-specific resources from communities other than the one in which they are headquartered. Their dependence on other communities requires them to be attentive to many communities and, on average, less attentive to the focal community. For example, local owners who are also multinationals may be subject to additional pressure to engage in global-level issues from supra-national stakeholders due to the nature of their operations (Kostova and Zaheer, 1999).

Control variables

Following existing studies (King and Shaver, 2001; Kim et al, 2019), we include a number of facility-level control variables to deal with various confounding factors that may impact a facility's environmental performances. These include log of facility's annual sales (*Sales*) to control for the size of a facility, a binary variable (*Independent*) to indicate that a facility does not own nor belong to any corporate family since an independent facility may lack sufficient resources to implement clean technologies and may be less concerned about corporate-level reputation. As changing the composition of chemical inputs may affect total releases of pollutants, we control for it by including types of chemical compounds that a facility processes (*No.of chemicals*). We also add a binary variable to indicate any kind of ultimate ownership change in a previous year (*Owner change*) as a facility may need to adjust its manufacturing processes after a change in ownership, regardless of whether the ownership changes involve a local owner or not. Additionally, we include a number of owner-level variables as managerial decisions at the corporate level could affect financial performance of facilities, which would have ensuing implications for environmental performances. Specifically, we control for an owner's sales (*Owner_sales* as log of its annual sales), its industry (*Owner_finance* = 1 when it is in finance industries and 0 otherwise) and type (*Owner_public* = 1 when it is publicly listed and 0 otherwise) of owner (Sampson and Zhou, 2018). Since firms headquartered in tax-haven countries may be less socially engaged than their peers, we add a binary variable (*Owner_tax haven*), switching to 1 if a facility's owner is located in tax-haven countries and 0 otherwise (Lee, 2020). We also include the number of facilities (*No. of subsidiaries*) that a focal facility's owner has to supervise in a focal year and the number of different states (*No. of states*) where these owned-facilities operate in the same year as there may exist (dis)economies of scale in managing facilities (King and Shaver, 2001). Table 1 reports the details of variable definition and sources, and Table 2 reports summary statistics and correlations of variables.

***Insert Tables 1 and 2 about here ***

Methodology

Our baseline specification examines the relationship between a facility's environmental pollution and its ownership status, while controlling for facility fixed effects, making our analysis a within-facility estimation. Specifically, we estimate the following regression:

$$Pollution_{it} = \alpha + \beta Local\ Owner_{it} + \chi_{it} + \phi_i + \ \phi_t + \ \varepsilon_{it}$$

where $Pollution_{it}$ is the natural log of environmental pollution in terms of (toxic or GHG) emissions of facility i in year t and $Local\ owner_{it}$ accounts for whether facility i is locally owned in year t. In addition, we include a vector of time-varying facility level χ_{it}. We also include facility fixed effects ϕ_i, which deal with the confounding effects of the unobserved time-invariant facility heterogeneity, as well as year fixed effects ϕ_t, which suppress any year-specific factors. In addition, in a robustness check we include state-year fixed effects, accounting for state-specific environmental changes based on the location of the facility. Robust standard errors are used in all regressions, and our results are consistent to clustering the standard errors by facility or state.

When it comes to GHG reporting, we estimate a linear probability model:

$$GHGReporting_{it} = \alpha + \beta Local\ Owner_{it} + \chi_{it} + \phi_k + \phi_s + \phi_t + \varepsilon_{it}$$

where $GHGReporting_{it}$ is a dummy variable that is coded 1 if facility i in year t reports its greenhouse gas emission and 0 otherwise. The baseline model for GHG reporting does not include facility-fixed effects, as very few facilities switched its disclosure status during the sample period, so we instead control for industry and state fixed effects (ϕ_k and ϕ_s, respectively), in addition to year fixed effects ϕ_t.

With regards to GHG emission, there are specific concerns with the OLS estimates. Given that there is selection into GHG disclosure, and that the factors accounting for selection are related to GHG emission, this could lead to biased estimates of the impact of local ownership on GHG emission. We address this by reporting a Heckman selection model. For the first stage, we estimate a probit model of the probability of GHG reporting. We construct an instrumental variable *Local Newspaper,* which measures the number of per capita local newspaper outlets using data from the News Desert Projects. This instrument captures the extent of attention from local media outlet these facilities face: local media put pressure on facilities by holding them accountable, which increases the likelihood of GHG disclosure. At the same time, the only way in which we think local media can impact GHG is by drawing attention to it. If facilities don't report GHG emissions, local media do not have the capacity to independently monitor the emission records. In other words, we think the pathway from local media to lower GHG goes through GHG reporting, making *Local Newspaper* satisfy the exclusion restriction requirement and, hence, a valid instrument for the Heckman selection model. Further, there is a concern about potential reverse causality, where the changes to local ownership may be driven by differences in toxic or greenhouse gas emissions (Berchicci, Dowell, and King, 2012). We deal with this concern in Supplementary Analyses I, where we run a series of tests showing that environmental performances in the previous year do not predict ownership changes involving a local owner.

Results

Main findings

Our baseline results are reported in Table 3. In M1, we examine the relationship between local ownership and releases of toxic chemical pollutants (H1), using OLS fixed effects regressions. As can be seen, its coefficient ($\beta = -0.15$, p = 0.07) shows a strong and negative relationship between local ownership and toxic emission. This implies that, consistent with our H1, a change in ownership of a facility from non-local owner to local owner is associated with a 14% decrease in toxic emission, other things being equal. M2 examines the relationship between local ownership and GHG disclosure (*H2a*), using a cross-sectional logit regression with state-, industry-, year-fixed effects. M2 shows a strong and negative relationship between local ownership and GHG disclosure ($\beta = -0.01$, p < 0.01), suggesting that the probability that a facility reports it GHG emissions to the EPA decreases by 10% when it is owned by a local parent. M3 examines the relationship between local ownership and releases of GHG (*H2b*). Given that GHG disclosure is voluntary, there might be selection into which facility chooses to report GHG emissions which may bias the results and we hence use the Heckman selection model. In Appendix 2, we report the first stage probit regression, finding a positive association between the instrument *Local Newspaper* and *GHG reporting* ($\beta = 1.92$, p < 0.01), consistent with our argument that local media put pressure on facilities by holding them accountable, which increases the likelihood of GHG disclosure. M3 includes the mills ratio from the first-stage as well as facility-fixed effects. It finds a strong and positive association between local ownership and GHG emissions ($\beta = 0.09$, p = 0.01), implying that, conditional on continuing to report, a facility increases its GHG emissions by 9.4% on average, when it is acquired by or merged with a local firm.

****Insert Table 3 about here ****

Overall, these results support the main hypotheses that local ownership is negatively associated with toxic releases and GHG reporting but positively with GHG releases. Several of the control variables are also significant across the models. The size of facility and the number of chemical compounds the facility processes are positively related to toxic releases, GHG reporting and releases. Facilities that are owned by a large public firm in the finance industry are more likely to report their GHGs emissions, consistent with the existing findings (Sampson and Zhou, 2018). When an owner is located in a tax-haven country, a facility releasees more GHGs, consistent with a recent finding that that firms headquartered in tax-haven countries may be less socially responsible (Lee, 2020).

Having demonstrated support for our main hypothesis, we now turn to consider the effect of the moderating factor, local embeddedness (H3a, H3b, H3c). Specifically, rather than treating local owners as homogenous, we account for their heterogeneity based on whether these locally headquartered owners also have operations outside of the local state, with the owners having operations elsewhere in the country or in the world being less dependent on the local community and therefore, less embedded. Table 4 reports these results, where *Local* is replaced with two binary variables, *Local_only* and *Local_beyond*, while all else is the same as Table 3. In M4, we find a strong and negative relationship between *Local_only* and toxic emission ($\beta = -0.25$, p = 0.02), a negative but insignificant relationship between *Local_beyond* and toxic emission ($\beta = -0.06$, p = 0.52). The difference between these coefficients is marginally significant (p= 0.07), suggesting that the negative relationship between local ownership and emissions of toxic chemicals is more pronounced when a facility's local owner has higher level of embeddedness in the local community, hence providing support for H3a. Next, M5 shows a strong and negative relationship between *Local_only* and GHG disclosure ($\beta = -0.02$, p < 0.01), a strong and positive relationship between *Local_beyond* and GHG disclosure ($\beta = 0.01$, p = 0.04). The difference between these two coefficients is also highly significant (p < 0.01), suggesting that a facility whose local owner is heavily dependent on the local community is much less likely to report its GHGs releases, supporting H3b. Lastly, M6 shows that both coefficients of *Local_only* and *Local_beyond* are positive (coefficients are 0.15 and 0.07, respectively) and significant (p-values are 0.05 and 0.01, respectively). The difference between two coefficients is statistically insignificant (p-value of difference is 0.13).

In M7-M9, we further split *Local_beyond* into *Local_domestic* and *Local_MNC*. *Local_domestic* is coded 1 if a facility's local owner operates only at the national level, owning facilities in other US states, but not in other countries. *Local_MNC*, on the other hand, is coded 1 when a facility's local owner has operations in other countries. The purpose of the analyses is to see whether having global level operations, or being embedded in the global issues, would make a difference to the extent to which these facilities pay attention to environmental issues. M7 finds that the negative effect of local ownership on toxic emissions is limited to facilities that are fully local (*Local only*: $\beta = -0.23$, p = 0.03). M8 finds that a strong and negative relationship between *Local_only* and GHG reporting ($\beta = -0.02$, p < 0.01) as well as between *Local_domestic* and GHG reporting ($\beta = -0.03$, p < 0.01), but a strong and positive relationship between *Local_MNC* and GHG reporting ($\beta = 0.04$, p < 0.01). The difference between these coefficients is significant (*Local_only* vs. *Local_MNC:* p< 0.01; *Local_only* vs. *Local_domestic:* p< 0.01), suggesting that locally headquartered MNC may behave differently from other locally owned organizations when it comes to GHG reporting. Further, M9 finds that a strong and positive relationship between *Local_only* and GHG emissions ($\beta = 0.15$, p = 0.05) as well as between *Local_domestic* and GHG emissions ($\beta = 0.13$, p = 0.06), but insignificant relationship between *Local_MNC* and GHG emissions ($\beta = 0.04$, p =0.41). The difference between these coefficients is marginally significant (*Local_only* vs. *Local_MNC:* p= 0.08; *Local_only* vs. *Local_domestic:* p= 0.09), again suggesting that locally headquartered MNCs is different from other locally owned organizations when it comes to GHG emissions, either because they may either genuinely care more about GHG emissions than other locally owned facilities being exposed to institutional norms elsewhere, or they may have more readily available GHG accounting and reporting technologies that could implemented in local facilities. Taken together and consistent with our main arguments: the results on toxic releases are mainly driven by the comparison between local only firms and other firms, while the results on GHG are driven by the difference between local firms and MNCs, suggesting that MNCs that are under additional pressure to reduce GHGs from supra-national organizations. Interestingly, the results also reveal that locally headquartered and domestic-owned facilities don't cut toxic emissions and also ease off on GHG reporting and emissions.

****Insert Table 4 about here ****

Supplementary analyses

As mentioned before, Supplementary Analyses (I) attempts to deal with the concern of reverse causality, where the change to local ownership may be driven by differences in local or global pollution. We report two sets of results to alleviate this concern. To start with, Figures 1a and 1b show that facilities that have experienced ownership changes involving local owners (their *Local* variable switches between 1 and 0 during the sample period) are no different from the other facilities in terms of environmental pollution. Specifically, Figure 1a records the frequency distribution of pollution intensity, measured as the average of toxic chemical emissions divided by average annual sales (log), of facilities with local ownership changes (solid line) and without (dotted line). Figure 1b presents the same for GHG emissions. Both figures show that the facilities that have been acquired by or sold to local owners during the sample period do not differ from the rest of facilities in the sample in terms of pollution.

Perhaps the decision to own a facility is not driven by its absolute environmental performance, but by its performance relative to its peers. Table 5 considers this possibility and runs a fixed-effect logit regression of local ownership on a facility's environmental performances in the previous year, while also including in the regression a binary variable of inferior capability (Berchicci et al, 2012), termed as *Heavy Polluter* and coded 1 if a facility has inferior environmental performances in comparison to its industry-state peers in the prior year. As local ownership would be positively related with the availability of financial resources within a locale and also institutional pressures, we additionally include the number of community banks (Smulowitz, Rousseau and Bromiley, 2020) and the number of other local-owned facilities in the same state as controls.

The results show that a facility's absolute performance in toxic chemicals (M10) and GHGs (M11) in the past year do not predict local ownership in the following year, consistent with Figures 1a and 1b. Further, a facility's relative performance in toxic chemicals (Model 10) and GHGs (Model 11) do not seem to predict being acquired by or merged with local owner, further alleviating concerns of reverse causality.

****Insert Figures 1a, 1b, and Table 5 about here ****

We argue that as local owners care more about local pollution, they would logically care less about global pollution to the extent that these are substitutes. In Table 6, Supplementary Analyses (II), we explore this trade-off in decision-making for these two pollutants by regressing GHG reporting/emissions on the level of toxic releases (M12 and M13), as well as an interaction term of *Local* and *Toxic releases* (M14 and M15). M12 shows that decreases in toxic releases is associated with a reduced probability of GHG reporting, consistent with toxic emissions and GHG being substitutes. M13 shows that this relationship is stronger for facilities owned by local parents ($p < 0.01$), suggesting that facilities owned by a local parent may prioritize reducing toxic releases over reporting their GHGs emissions. M14 and M15 shows a negative but insignificant interaction between local ownership and toxic releases, broadly consistent with the idea that reducing toxic releases may become a priority when facilities become local-owned, which requires them to distribute limited resources to implement practices to decrease toxic at the expense of increasing GHGs.

****Insert Table 6 about here ****

To further examine the mechanisms behind the relationships that we hypothesize, we conduct two separate analyses in Supplementary Analyses (III). In particular, we want to ensure that the local owners' motivation to reduce toxic pollutants is derived from its commitment to the local community rather than its intention to avoid enforcement actions by the regulator. To that end, we create two dependent variables, *Clean Technology* and *EPA actions*, and regress them on our *Local* variable. The former counts the number of source reduction clean technologies that a facility implements in year *t+1* and the latter records whether a facility receives any enforcement action (i.e., inspection, informal warning letter or formal penalty) by the EPA in year *t+1*. According to the EPA, source reduction technology is to reduce the quantity or toxicity of waste prior to recycling, treatment or disposal, by changing the processes that generate pollutants in the first place. Thus, it is preferable to other types of technology as it can correct more fundamental issues of pollution generation[5], while requiring more modifications to existing production processes compared to 'End-Of-Pipe' type of treatment, and thus having more disruptive effect on the current processes.

[5] An EPA report (accessed at https://www.epa.gov/toxics-release-inventory-tri-program/measuring-impact-source-reduction) suggests that the average source reduction project causes a 9% to 16% decrease in chemical releases in the year the project is implemented.

Therefore, installing source reduction technologies is a signal of the firm's stronger commitment to environmentally sustainable practices. M16 shows that a facility is more likely to implement more source reduction technologies in the following year when it is owned by a local firm. Although P2 (Pollution Prevention) database only records technologies to reduce releases of toxic chemicals, we also control for a facility's GHGs releases (M17) to show that the result still holds. On the other hand, *Local* coefficient in M18 is no longer significant when the dependent variable is *EPA action* (p-value is 0.53). The result is consistent when we also control GHGs emissions in M19 which is not regulated by the EPA. Thus, we see no evidence that local ownership increases regulatory oversight for a facility, forcing it to reduce toxic emissions. These results collectively show that the motivation behind the reduction of toxic emissions under local ownership is most likely a facility's commitment to the local community, rather than more stringent oversight by the EPA.

****Insert Table 7 about here ****

Next, we examine how the directionality of the change (to/from local ownership) is associated with pollution in Table 8 by further specifying the variable *Local* into *To Local* and *From Local*; the former turns into 1 when a facility is sold to a local owner by a non-local owner and the latter takes care of changes that happen in the opposite direction. For toxic emissions (M20), *To Local* is negative and significant ($\beta = -0.25$, p =0.03) while *From Local* is positive and insignificant. On the other hand, for GHG emissions (M21), *From Local* is negative and significant ($\beta = -0.13$, p =0.01) while *To Local* is positive but insignificant. The differences between these two coefficients in both models are statistically significant as well (p<0.01). These results suggest that a manager's attention for sustainability may shift following ownership change. In specific, a facility becomes much more attentive on pollutants with bounded local externalities when its new owner is expected to be more concerned about pressures from the local community, but it becomes more focused on pollutants with global externalities when its new owner is less susceptible to local pressures but more to global pressures.

****Insert Table 8 about here ****

Lastly, we perform a series of robustness tests in the appendices to make sure that our results are robust to using alternative specifications in regression models. In particular, we replace year fixed effect with state-year fixed effect to further control any state specific effects that may be time varying, such as institutional pressures (Appendix 3). For our main predictor, we calculate the physical distance between a facility and its parent and use the threshold (150 miles) used in the prior work (Kim et al, 2019) to define local ownership (AM26-28 in Appendix 4-1). We also replace annual sales of facility with the number of employees of facility to control the size of a facility (AM 29-31 in Appendix 4-1). Lastly, for possible multicollinearity concerns (Kalnins, 2018), we run the analyses while dropping the most highly correlated variables and also dropping all the control variables (AM 32-40 in Appendix 4-2). Our results hold in all of these robustness analyses.

Conclusions and discussion

This study examines the role of local ownership on firm environmental performance, distinguishing between pollutants that generate local externalities and pollutants that generate global externalities. Using a sample of 14,369 U.S. facilities in the manufacturing sector from 2010 to 2018, we show that changes of ownership in the facilities from non-local owner to local owner is associated with both a decrease in toxic emission (local externality), as well as a decrease in GHG reporting and an increase in GHG actual emission (global externality). We also find consistent evidence that the discrepancy in environmental performances of a locally-owned facility is due to local owner's high commitment to the local community, and thus increases with its embeddedness in the community, with more embedded owners placing greater priority on reducing local pollution, and being more willing to increase GHG emissions.

These findings contribute to the literature on corporate sustainability and environmental performance. In particular, while prior work has separately examined firm's environmental performances in toxic pollutants (Delmas and Toffel, 2008) and GHGs (Delmas and Montes-Sancho, 2010; Dowell et al, 2020; Hiatt, Grandy and Lee, 2015), we highlight the need to consider both together while evaluating firm environmental performance. We also underline the role of ownership – particularly, local ownership – and provide a more nuanced picture of local ownership. Our findings show that local owners are not always more environmentally friendly – they are only less likely to pollute locally – and that local embeddedness enhances the effects of local ownership for pollution. Lastly, our study is one of very few studies that use a facility fixed effect in examining the ownership impact on a facility's environmental performance. Prior work either conducts a cross-sectional analysis, using observations from only one year or averaging across multiple years (Grant et al, 2004; Berrone et al 2010) or takes a random effect approach (King and Shaver, 2001). By collecting panel data on ownership and using a facility-level fixed effect, our study intends to produce more robust results that control for unobservable facility-specific factors that affects environmental performance.

Further, our study has important implications for public policy. We argue and show that the discrepancy in environmental performance of local-owned facilities is attributable to inconsistent pressure among their stakeholders on local and global matters. In particular, our findings suggest that firms may not apply coherent standards in their environmental practices, "decoupling" their sustainability strategy (Meyer and Rowan, 1977). This highlights the need for a more comprehensive approach when seeking to promote firm environmental performance through policy. Our findings suggest that it may be more important to regulate global externalities than to regulate local externalities, as local externalities may be handled by pressure from local stakeholders, while global externalities are not. Thus, our study supports policy makers' efforts to promote regulation of GHG as mandatory at a national level where strict enforcement may be more crucial.

As with any study, ours has several limitations. First, while we have tried to deal with the concern that local ownership change is nonrandom, we cannot completely rule out the possibility of endogeneity in ownership change, given the observational nature of our data. Future work could look to alternative empirical designs to better identify the effects of local ownership. Second, multiple definitions can exist to determine the level of local community. While we use a US state as the unit for local community in our study, following prior work (Grant et al, 2004), future work could use more fine-grained definition of local (Kim et al, 2019). Similarly, future work could study communities in non-U.S. contexts, where the boundary of communities and the concerns about global externalities may well vary from our paper.

In summary, our study examines the role of local ownership on firm environmental performance, using US facilities in the manufacturing sector and distinguishing pollutants of local externalities (toxic chemicals) from pollutants of global externalities (GHGs). We show that changes of ownership in the facilities from non-local owner to local owner is associated with a decrease in toxic emissions, a decrease in GHG reporting, and an increase in GHG emissions, and that these relationships are positively moderated by local owners' local embeddedness. By doing so, we show that firms maintain different standards for different types of pollutants, and that factors that drive them to improve on one type may cause them to do worse on the other type, with important implications for both sustainability strategy and policy.

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Table 1. Description and source of variables

Variable	Description	Source
Toxic releases	Natural log of toxic chemical releases	EPA
GHG reporting	1 when a facility report GHG releases	EPA
GHG releases	Natural log of GHGs releases	EPA
No.of source reduction technologies	Number of waste source reduction technologies that a facility implemented	EPA
EPA actions	Number of enforcement actions that a facility receives	EPA
Local	1 when a facility is owned by a firm that is in the same state	D&B, EPA, News media
Local_Only	1 when a facility's local owner has operations only in the local state	Same as above
Local_Beyond	1 when a facility's local owner has operations in other states or other countries	Same as above, Compustat, ORBIS
Sales	Natural log of sales (facility)	D&B, EPA
Independent	1 if a facility is not owned by a firm and does not own any other facilities	D&B
No. of chemicals	Number of different types of chemical compounds	EPA
Change of owner	Change of owner	D&B
Public(Owner)	1 if owner is a public company	D&B
Finance(Owner)	1 if owner is in finance industry	D&B
Sales(Owner)	Natural log of sales (owner)	
Tax haven(Owner)	1 if owner is located in a tax-haven country	D&B, POLCON
No.of subsidiaries(Owner)	Number of subsidiaries that belong to the owner	D&B
No.of states operating(Owner)	Number of states that an owner's subsidiaries operate	D&B
Heavy polluters (Toxic, GHG)	1 if emitting more than average of peer facilities	EPA
No. of community banks	Commercial lending banks of assets below 1 bil USD	Federal Deposit Insurance Corporation
No. of local-owned facilities	Number of locally-owned facilities in a focal state	EPA, D&B
Local Newspaper	The number of newspaper outlets divided by the population	University of North Carolina
Local_Domestic	1 when a facility's local owner has operations in other states but not in foreign countries	D&B, EPA, News media, Compustat
Local_MNC	1 when a facility's local owner has operations in foreign countries	Same as above
Local(miles)	1 when a facility is owned by a firm within 150 miles from a focal state	EPA, D&B
No.of employees	Number of facility employee	D&B

Table2.Descriptive statistics of variables

	Mean	St.Dev	Max	Min	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1) Toxic emissions	6.3	4.1	17.7	1.1														
(2) GHG reporting	0.2	0.4	1.0	0.0	0.24													
(3) GHG emissions	11.5	1.5	16.3	0.7	0.37	.												
(4) Clean tech	0.5	1.9	87.0	0.0	0.05	0.04	-0.02											
(5) EPA action	0.0	0.2	1.0	0.0	0.00	0.03	-0.01	0.00										
(6) Local	0.4	0.5	1.0	0.0	-0.03	-0.12	-0.06	0.02	-0.00									
(7) Local only	0.3	0.4	1.0	0.0	-0.12	-0.15	-0.12	-0.01	-0.00	0.65								
(8) Local beyond	0.1	0.3	1.0	0.0	0.08	0.03	0.03	0.03	-0.00	0.67	-0.13							
(9) Sales	8.0	8.3	24.9	0.0	-0.04	-0.10	-0.03	0.02	0.01	0.26	0.34	0.01						
(10) Independent	0.2	0.4	1.0	0.0	-0.06	-0.14	-0.10	-0.01	0.00	0.49	0.75	-0.09	0.37					
(11) No.of chemicals	3.7	5.1	109.0	1.0	0.46	0.43	0.50	0.07	-0.01	-0.01	-0.10	0.08	-0.02	-0.08				
(12) Owner change	0.0	0.2	1.0	0.0	0.01	0.01	-0.01	-0.01	0.01	-0.04	-0.04	-0.02	0.01	-0.05	0.02			
(13) Public	0.4	0.5	1.0	0.0	-0.01	0.10	0.06	0.01	0.00	-0.17	-0.34	0.11	-0.16	-0.27	0.12	-0.00		
(14) Finance	0.0	0.2	1.0	0.0	-0.02	0.02	-0.03	-0.02	0.00	-0.13	-0.08	-0.09	-0.05	-0.07	-0.01	0.04	-0.04	
(15) Sales(owner)	20.0	3.8	26.7	0.0	0.09	0.15	0.05	0.00	0.00	-0.18	-0.32	0.08	-0.21	-0.29	0.15	-0.02	0.46	0.08
(16) Taxhaven	0.0	0.2	1.0	0.0	-0.03	0.01	0.11	-0.02	0.01	-0.12	-0.08	-0.08	-0.01	-0.06	-0.04	-0.04	-0.01	0.24
(17) No.of subsidiaries	15.5	28.7	181.0	1.0	0.05	0.08	0.05	-0.01	0.01	-0.22	-0.23	-0.06	-0.24	-0.18	-0.01	-0.02	0.14	0.14
(18) No.of subsidiary states	6.4	7.8	36.0	1.0	0.03	0.11	0.03	-0.01	-0.00	-0.29	-0.32	-0.06	-0.30	-0.25	-0.00	-0.00	0.21	0.08
(19) No.of community banks	88.5	58.6	286.0	0.0	0.03	0.01	0.07	-0.00	-0.03	0.07	0.02	0.07	-0.03	0.00	0.09	0.00	0.02	0.04
(20) No.of local-owned	215.6	143.1	473.0	0.0	-0.05	-0.04	-0.03	0.01	-0.00	0.12	0.01	0.14	-0.01	-0.01	-0.02	-0.00	0.03	0.07
(21) Heavy polluter(Toxic)	0.6	0.5	1.0	0.0	0.34	0.16	0.16	-0.00	0.00	-0.02	-0.08	0.04	-0.03	-0.04	0.16	0.02	0.01	0.01
(22) Heavy polluter(GHG)	0.6	0.5	1.0	0.0	0.04	0.45	0.20	0.01	-0.01	-0.01	-0.06	0.04	0.01	-0.02	0.03	-0.02	0.02	-0.02
(23) Local Newspaper	0.4	0.3	0.2	0.0	0.07	0.08	0.02	-0.01	0.02	0.02	0.07	-0.03	0.09	0.13	-0.02	-0.02	-0.11	-0.05
(24) Local domestic	0.0	0.2	1.0	0.0	0.06	-0.01	0.04	0.04	0.01	0.38	-0.08	0.57	0.06	-0.05	-0.01	-0.00	-0.07	-0.05
(25) Local MNC	0.0	0.2	1.0	0.0	0.06	0.05	0.00	0.01	-0.01	0.53	-0.09	0.77	-0.03	-0.08	0.10	-0.02	0.19	-0.07
(26) Local(km)	0.3	0.5	1.0	0.0	-0.06	-0.14	-0.11	0.02	0.00	0.82	0.66	0.42	0.31	0.56	-0.07	-0.05	-0.22	-0.12
(27) No.employees	300.1	1871.9	171339	0.0	0.05	0.05	-0.02	0.04	-0.00	-0.02	-0.03	0.00	0.05	-0.03	0.02	0.01	0.01	0.01

	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)
(15) Sales(owner)	0.08													
(16) Taxhaven	0.24	-0.13												
(17) No.of subsidiaries	0.14	0.38	-0.00											
(18) No.of subsidiary states	0.08	0.42	-0.02	0.86										
(19) No.of community banks	0.04	0.01	-0.02	-0.00	0.00									
(20) No.of local-owned	0.07	0.02	0.04	-0.03	-0.03	0.62								
(21) Heavy polluter(Toxic)	0.01	0.00	0.05	0.03	0.02	0.02	0.04							
(22) Heavy polluter(GHG)	-0.02	0.01	0.01	0.03	0.04	-0.07	-0.07	0.32						
(23) Local Newspaper	-0.05	-0.02	-0.06	0.08	0.06	-0.28	-0.31	-0.09	-0.03					
(24) Local domestic	-0.05	-0.03	-0.04	-0.07	-0.08	-0.01	0.02	0.01	0.01	0.08				
(25) Local MNC	-0.07	0.11	-0.06	-0.02	-0.02	0.10	0.15	0.05	0.04	-0.10	-0.06			
(26) Local(km)	-0.12	-0.22	-0.11	-0.23	-0.29	0.01	0.06	-0.07	-0.01	0.08	0.24	0.33		
(27) No.employees	0.01	0.05	-0.01	-0.01	-0.01	-0.01	0.00	-0.03	-0.06	-0.02	-0.00	0.00	-0.02	

Table 3. Main results (H1, H2a, H2b)

VARIABLES	M1 Toxic Emissions	M2 GHG Reporting	M3 GHG Emissions
Local = 1	-0.15*	-0.01***	0.09**
	(0.07)	(0.00)	(0.01)
Sales	0.23***	0.00***	0.12***
	(0.00)	(0.00)	(0.01)
Independent	0.05	-0.01***	-0.07
	(0.55)	(0.00)	(0.49)
No. of chemicals	0.25***	0.02***	0.02***
	(0.00)	(0.00)	(0.00)
Change of owner	-0.02	-0.00	-0.03
	(0.53)	(0.28)	(0.31)
Public (Owner)	-0.03	0.01***	0.01
	(0.56)	(0.00)	(0.67)
Finance (Owner)	-0.02	0.01**	-0.03
	(0.80)	(0.04)	(0.47)
Sales (Owner)	-0.00	0.00***	-0.01**
	(0.45)	(0.00)	(0.02)
Tax haven (Owner)	-0.11	-0.01	0.06*
	(0.42)	(0.19)	(0.09)
No.of subsidiaries (Owner)	0.00	-0.00*	0.00***
	(0.15)	(0.07)	(0.00)
No.of states operating(Owner)	-0.01	0.00*	-0.00
	(0.19)	(0.06)	(0.62)
Mills ratio			-0.32***
			(0.00)
Observations	98,958	98,958	13,141
R-squared	0.04	0.41	0.03
Number of facilities	14,369		1,859
Facility FE	YES		YES
Year FE	YES	YES	YES
Industry FE		YES	
State FE		YES	

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4. Local embeddedness (H3a, H3b, H3c)

VARIABLES	M4 Toxic Emissions	M5 GHG Reporting	M6 GHG Emissions	M7 Toxic Emissions	M8 GHG Reporting	M9 GHG Emissions
Local only	-0.25**	-0.02***	0.15*	-0.23**	-0.02***	0.15*
	(0.02)	(0.00)	(0.05)	(0.03)	(0.00)	(0.05)
Local non-only	-0.06	0.01**	0.07**			
	(0.52)	(0.04)	(0.01)			
*Difference1**	*0.07*	*0.00*	*0.13*			
Local domestic				0.07	-0.03***	0.13**
				(0.51)	(0.00)	(0.05)
Local MNC				-0.13	0.04***	0.04
				(0.36)	(0.00)	(0.41)
*Difference2**				*0.03*	0.29	0.37
*Difference3**				*0.57*	0.00	0.08
*Difference4**				*0.20*	0.00	0.09
Sales	0.23***	0.00***	0.12***	0.23***	0.00***	0.12***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Independent	0.12	-0.00	-0.13	0.11	-0.00	-0.13
	(0.23)	(0.30)	(0.19)	(0.29)	(0.48)	(0.19)
No. of chemicals	0.25***	0.02***	0.02***	0.25***	0.02***	0.02***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Change of owner	-0.02	-0.01	-0.04	-0.02	-0.01	-0.04
	(0.51)	(0.16)	(0.12)	(0.53)	(0.12)	(0.12)
Public (Owner)	-0.04	0.01***	0.00	-0.03	0.00	0.01
	(0.47)	(0.00)	(0.89)	(0.59)	(0.60)	(0.83)
Finance (Owner)	-0.02	0.01*	-0.03	-0.02	0.01*	-0.03
	(0.77)	(0.06)	(0.38)	(0.81)	(0.06)	(0.42)
Sales (Owner)	-0.00	0.00***	-0.00	-0.01	0.00***	-0.00
	(0.39)	(0.00)	(0.18)	(0.34)	(0.00)	(0.19)
Tax haven (Owner)	-0.11	-0.01	0.06	-0.11	-0.01	0.06
	(0.42)	(0.22)	(0.13)	(0.42)	(0.24)	(0.13)
No.of subsidiaries (Owner)	0.00	-0.00	0.00	0.00	-0.00	0.00
	(0.14)	(0.21)	(0.22)	(0.14)	(0.22)	(0.23)
No.of states operating(Owner)	-0.01	0.00	0.00	-0.01	0.00	0.00
	(0.17)	(0.13)	(0.63)	(0.18)	(0.22)	(0.66)
Mills ratio			-0.29***			-0.29***
			(0.00)			(0.00)
Observations	98,958	98,958	13,141	98,958	98,958	13,141
R-squared	0.04	0.41	0.03	0.04	0.41	0.03
Number of facilities	14,369		1,859	14,369		1,859
Facility FE	YES		YES	YES		YES
Year FE	YES	YES	YES	YES	YES	YES
Industry FE		YES			YES	
State FE		YES			YES	

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. *Difference indicates a p-value of differences of coefficients, Local only and Local-non only(Difference 1), Local only and Local domestic (Difference 2), Local only and Local MNC (Difference 3), Local domestic and Local MNC (Difference 4).

Supplementary Analyses (I): Selection into Local Ownership

Table5.

VARIABLES	M10 Local ownership	M11 Local ownership
Toxic releases	-0.05	
	(0.15)	
Heavy polluter(Toxic)	0.54	
	(0.36)	
GHG releases		0.16
		(0.46)
Heavy polluter(GHG)		-0.76
		(0.43)
No. community bank	0.01	0.03***
	(0.17)	(0.00)
No. local-owned	0.02*	-0.00
	(0.08)	(0.87)
Sales	-0.25**	1.17**
	(0.04)	(0.04)
Independent	3.03***	3.19***
	(0.00)	(0.00)
No. of chemicals	0.08**	0.08
	(0.05)	(0.22)
Change of owner	-0.41***	-0.08
	(0.00)	(0.78)
Public (Owner)	-0.89***	-1.04***
	(0.00)	(0.00)
Finance (Owner)	-0.96***	-2.17***
	(0.00)	(0.00)
Sales (Owner)	0.06***	0.07*
	(0.00)	(0.05)
Tax haven (Owner)	-2.34	-12.45
	(0.15)	(0.98)
No.of subsidiaries (Owner)	-0.04***	-0.02
	(0.00)	(0.27)
No.of states operating(Owner)	-0.02	-0.07
	(0.60)	(0.20)
Observations	4,502	756
Number of facilities	648	106
Year FE	YES	YES
Facility FE	YES	YES

Figure 1a.

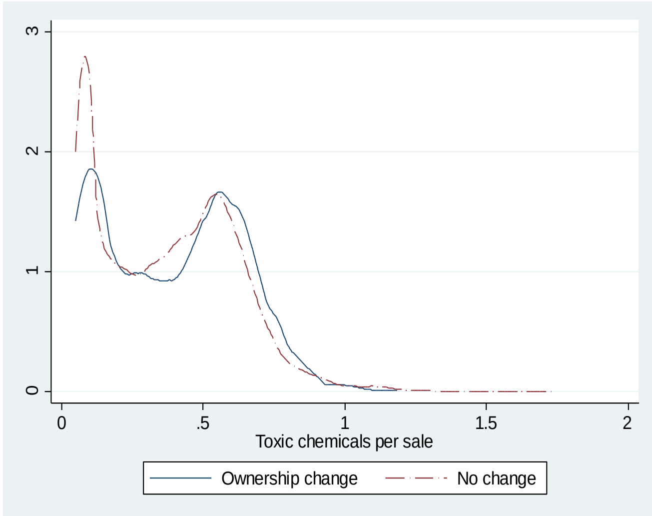
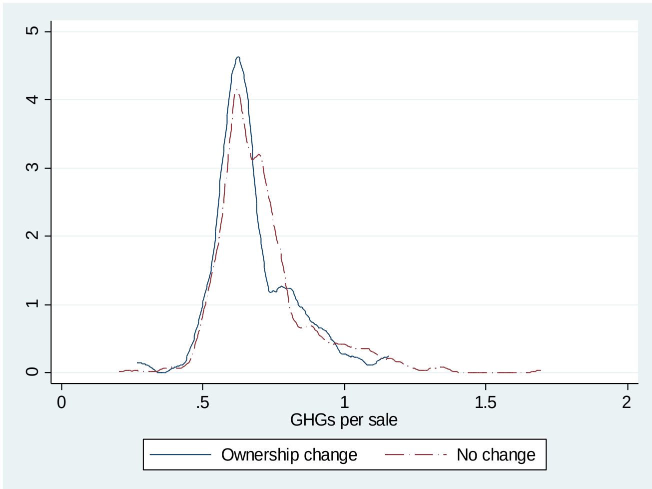


Figure 1b.



-Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

-Ownership change (solid line) refers to facilities who have experienced ownership changes involving local parents during the sample period while No change refers to the rest of facilities in the final sample.

Table 6. Supplementary Analyses (II)

VARIABLES	M12 GHG Reporting	M13 GHG Reporting	M14 GHG Emissions	M15 GHG Emissions
Toxic releases	0.02***	0.02***	0.05***	0.06***
	(0.00)	(0.00)	(0.00)	(0.00)
Local = 1	-0.01**	0.04***	0.09**	0.29
	(0.02)	(0.00)	(0.01)	(0.12)
Local X Toxic releases		-0.01***		-0.02
		(0.00)		(0.29)
Sales	0.00***	0.00***	0.12***	0.11***
	(0.00)	(0.00)	(0.01)	(0.01)
Independent	-0.01***	-0.01***	-0.07	-0.07
	(0.00)	(0.00)	(0.46)	(0.48)
No. of chemicals	0.02***	0.02***	0.02***	0.01***
	(0.00)	(0.00)	(0.01)	(0.01)
Change of owner	-0.00	-0.00	-0.03	-0.03
	(0.31)	(0.37)	(0.29)	(0.26)
Public (Owner)	0.00**	0.01***	0.01	0.01
	(0.03)	(0.00)	(0.70)	(0.78)
Finance (Owner)	0.00	0.00	-0.03	-0.04
	(0.48)	(0.79)	(0.38)	(0.30)
Sales (Owner)	0.00***	0.00***	-0.01*	-0.01*
	(0.00)	(0.00)	(0.09)	(0.07)
Tax haven (Owner)	-0.01	-0.00	0.06	0.06
	(0.21)	(0.50)	(0.13)	(0.14)
No.of subsidiaries (Owner)	0.00	0.00	0.00**	0.00**
	(0.66)	(0.26)	(0.02)	(0.02)
No.of states operating(Owner)	0.00	-0.00	-0.00	-0.00
	(0.67)	(0.88)	(0.73)	(0.71)
Mills ratio			-0.24***	-0.24***
			(0.01)	(0.01)
Observations	98,958	98,958	13,113	13,113
R-squared	0.44	0.45	0.04	0.04
Industry FE	YES	YES		
State FE	YES	YES		
Year FE	YES	YES	YES	YES
Number of facilities			1,859	1,859
Facility FE			YES	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 7. Supplementary Analyses (III)

VARIABLES	M16 Clean tech	M17 Clean tech	M18 EPA_action	M19 EPA_action
Local = 1	0.13**	0.43**	-0.01	0.01
	(0.05)	(0.04)	(0.37)	(0.79)
Toxic releases	0.02***	0.05***	-0.00	0.00
	(0.00)	(0.00)	(0.42)	(0.76)
GHG releases		0.06		0.00
		(0.38)		(0.52)
Sales	0.04	0.01	0.00*	-0.01
	(0.13)	(0.96)	(0.09)	(0.32)
Independent	-0.26***	-0.46	-0.01	0.01
	(0.01)	(0.10)	(0.24)	(0.65)
No. of chemicals	-0.00	-0.00	-0.00	-0.00
	(0.98)	(0.88)	(0.67)	(0.15)
Change of owner	-0.02	-0.03	0.00	0.02*
	(0.42)	(0.77)	(0.19)	(0.10)
Public (Owner)	0.01	-0.04	0.01	0.03**
	(0.83)	(0.75)	(0.25)	(0.03)
Finance (Owner)	0.08	0.21	0.01	0.01
	(0.40)	(0.47)	(0.13)	(0.66)
Sales (Owner)	-0.00	-0.01	-0.00***	-0.00
	(0.63)	(0.55)	(0.00)	(0.21)
Tax haven (Owner)	0.05	0.67***	0.01	0.01
	(0.60)	(0.01)	(0.54)	(0.77)
No.of subsidiaries (Owner)	-0.00***	-0.00	-0.00**	-0.00
	(0.01)	(0.16)	(0.04)	(0.80)
No.of states operating(Owner)	0.01*	0.04***	0.00	-0.00
	(0.05)	(0.00)	(0.62)	(0.38)
Observations	87,062	12,760	98,958	14,393
R-squared	0.01	0.01	0.02	0.05
Number of facilities	14,042	1,858	14,369	1,873
Facility FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table8. Supplementary Analyses (IV)

VARIABLES	M20 Toxic	M21 GHG
To Local	-0.25**	0.00
	(0.03)	(0.93)
From Local	0.10	-0.13**
	(0.27)	(0.01)
Sales	0.23***	0.12***
	(0.00)	(0.01)
Independent	0.04	-0.09
	(0.64)	(0.36)
No. of chemicals	0.25***	0.02***
	(0.00)	(0.00)
Change of owner	-0.01	-0.02
	(0.71)	(0.43)
Public (Owner)	-0.03	0.01
	(0.56)	(0.79)
Finance (Owner)	-0.02	-0.03
	(0.80)	(0.43)
Sales (Owner)	-0.00	-0.01**
	(0.50)	(0.03)
Tax haven (Owner)	-0.11	0.06
	(0.43)	(0.13)
No.of subsidiaries (Owner)	0.00	0.00***
	(0.15)	(0.00)
No.of states operating(Owner)	-0.01	-0.00
	(0.19)	(0.56)
Mills Ratio		-0.33***
		(0.00)
Observations	98,958	13,141
R-squared	0.04	0.03
Number of facilities	14,369	1,859
Facility FE	YES	YES
Year FE	YES	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Appendix 1. Sample Distribution for Local Ownership

State	# of facilities	% of facilitie s
Texas	134	18%
Ohio	102	14%
California	88	15%
Pennsylvania	70	12%
Wisconsin	66	14%
Illinois	62	12%
Michigan	59	14%
Indiana	55	12%
Georgia	54	16%
North Carolina	46	13%
Alabama	44	16%
Missouri	43	16%
Tennessee	43	13%
New York	38	12%
Florida	35	15%
Minnesota	34	13%
South Carolina	34	12%
Iowa	30	12%
Virginia	29	16%
Arkansas	27	14%

Industry	# of facilities	% of facilities
Basic Chemical Manufacturing(3251)	113	15%
Cement and Concrete Product Manufacturing(3273)	74	16%
Other Chemical Product and Preparation Manufacturing(3259)	62	16%
Plastics Product Manufacturing(3261)	62	11%
Other Fabricated Metal Product Manufacturing(3329)	60	18%
Coating, Engraving, Heat Treating, and Allied Activities(3328)	55	11%
Semiconductor and Other Electronic Component Manufacturing(3344)	54	16%
Petroleum and Coal Products Manufacturing(3241)	40	11%
Agriculture, Construction, and Mining Machinery Manufacturing(3331)	37	25%
Pulp, Paper, and Paperboard Mills(3221)	34	19%
Aerospace Product and Parts Manufacturing(3364)	34	20%
Architectural and Structural Metals Manufacturing(3323)	33	17%
Pharmaceutical and Medicine Manufacturing(3254)	31	29%
Nonferrous Metal (except Aluminum) Production and Processing(3314)	31	17%
Foundries(3315)	29	9%
Dairy Product Manufacturing(3115)	28	10%
Animal Slaughtering and Processing(3116)	28	14%
Motor Vehicle Parts Manufacturing(3363)	28	7%
Animal Food Manufacturing(3111)	26	11%
Soap, Cleaning Compound, and Toilet Preparation Manufacturing(3256)	26	16%

*NAICS four-digit code in parenthesis

Appendix 2. Selection into GHG reporting (Probit)

VARIABLES	AM22 1st stage
Local Newspaper	1.92***
	(0.00)
Local = 1	-0.10***
	(0.00)
sales	0.00***
	(0.00)
single_location	-0.22*
	(0.06)
# of chemicals	0.11***
	(0.00)
ult_change = 1	-0.02
	(0.44)
public owner	0.08***
	(0.00)
finance owner	0.08***
	(0.01)
owner sales	0.03***
	(0.00)
L_taxforeign	0.01
	(0.75)
same_glob_ult	-0.00***
	(0.00)
#of states of subsidiares	0.01***
	(0.00)
Observations	90,804
Industry FE	YES
State FE	YES
Year FE	YES

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Appendix3. State-Year Fixed effect

VARIABLES	AM23 Toxic Emissions	AM24 GHG Reporting	AM25 GHG Emissions
Local = 1	-0.14*	-0.01***	0.08**
	(0.08)	(0.00)	(0.04)
Sales	0.23***	0.00***	0.12***
	(0.00)	(0.00)	(0.01)
Independent	0.05	-0.00***	-0.04
	(0.55)	(0.00)	(0.71)
No. of chemicals	0.25***	0.02***	0.02***
	(0.00)	(0.00)	(0.00)
Change of owner	-0.02	-0.00	-0.02
	(0.52)	(0.28)	(0.34)
Public (Owner)	-0.03	0.01***	0.02
	(0.55)	(0.00)	(0.47)
Finance (Owner)	-0.01	0.01**	-0.01
	(0.83)	(0.04)	(0.78)
Sales (Owner)	-0.00	0.00***	-0.01**
	(0.46)	(0.00)	(0.01)
Tax haven (Owner)	-0.09	-0.01	0.07*
	(0.51)	(0.19)	(0.07)
No.of subsidiaries (Owner)	0.00	-0.00*	0.00***
	(0.16)	(0.08)	(0.01)
No.of states operating(Owner)	-0.01	0.00*	-0.00
	(0.16)	(0.07)	(0.70)
Mills ratio			-0.32***
			(0.00)
Observations	98,958	98,958	13,141
R-squared	0.05	0.41	0.06
Number of facilities	14,369		1,859
Facility FE	YES		YES
State Year FE	YES		YES
Industry FE		YES	
State Year FE		YES	

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Appendix 4-1. Robustness checks

VARIABLES	AM26 Toxic Emissions	AM27 GHG Reporting	AM28 GHG Emissions	AM29 Toxic Emissions	AM30 GHG Reporting	AM31 GHG Emissions
Local(distance)	-0.15*	-0.01***	0.10**			
	(0.08)	(0.00)	(0.03)			
Local				-0.15*	-0.01***	0.09**
				(0.06)	(0.00)	(0.01)
No.of employees				0.00	0.00***	0.00***
				(0.28)	(0.00)	(0.00)
Mills ratio			-0.32***			-0.33***
			(0.00)			(0.00)
Observations	98,949	98,949	13,133	98,958	98,958	13,141
R-squared	0.04	0.41	0.03	0.04	0.41	0.02
Number of facilities	14,368		1,858	14,369		1,859
Controls included	YES	YES	YES	YES	YES	YES
Facility FE	YES		YES	YES		YES
Year FE	YES	YES	YES	YES	YES	YES
Industry FE		YES			YES	
State FE		YES			YES	

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Appendix 4-2. Robustness checks

VARIABLES	AM32 Toxic Emissions	AM33 GHG Reporting	AM34 GHG Emissions	AM35 Toxic Emissions	AM36 GHG Reporting	AM37 GHG Emissions	AM38 Toxic Emissions	AM39 GHG Reporting	AM40 GHG Emissions
Local	-0.13*	-0.01***	0.09*	-0.14*	-0.01***	0.09**	-0.14**	-0.03***	0.10**
	(0.08)	(0.00)	(0.06)	(0.08)	(0.00)	(0.01)	(0.03)	(0.00)	(0.03)
Sales	0.23***	0.00***	0.12***	0.23***	0.00***	0.12***			
	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.01)			
Independent	*Dropped*	*Dropped*	*Dropped*	0.05	-0.01***	-0.07			
				(0.55)	(0.00)	(0.50)			
#of states of subsidiares	-0.01	0.00*	-0.00	*Dropped*	*Dropped*	*Dropped*			
	(0.19)	(0.06)	(0.62)						
Mills ratio			-0.37***			-0.32***			-0.51***
			(0.00)			(0.00)			(0.00)
Observations	98,958	98,958	13,141	98,958	98,958	13,141	98,958	98,958	13,141
R-squared	0.04	0.41	0.02	0.04	0.41	0.03	0.00	0.32	0.01
Number of facilities	14,369		1,859	14,369		1,859	14,369		1,859
Controls included	YES	YES	YES	YES	YES	YES	NO	NO	NO
Facility FE	YES		YES	YES		YES	YES		YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry FE		YES			YES			YES	
State FE		YES			YES			YES	

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1