Document de Recherche du Laboratoire d'Économie d'Orléans

DR LEO 2016-04

Is Reputation at Stake When Environmentally Responsible Multinationals Invest Abroad? An Empirical Investigation

Rémi BAZILLIER
Sophie HATTE
Julien VAUDAY

Laboratoire d'Économie d'Orléans
Collegium DEG
Rue de Blois - BP 26739
45067 Orléans Cedex 2
Tél. : (33) (0)2 38 41 70 37
e-mail : leo@univ-orleans.fr
www.leo-univ-orleans.fr/

Is Reputation At Stake When Environmentally Responsible Multinationals Invest Abroad? An Empirical Investigation

Rémi BAZILLIER*, Sophie HATTE† and Julien VAUDAY‡

February 2016

Abstract

Globalization allows multinational firms to locate strategically the polluting activities in lax countries. This paper revisits the empirical evidence by exploiting heterogeneity in firms' environmental image. While locating in countries with weak environmental standards is likely to be detrimental for a firm's image and reputation, investing in corporate environmental responsibility can help firms to convince consumers that they have good environmental practices, even when investing in the "dirty" countries. Exploiting an original database that records an index of environmental responsibility for large European firms, we find that the firms viewed as environmental-friendly are more often than others located in countries with weak environmental regulations. We show that our findings are not likely to be driven by omitted variables bias, specific sectors nor particular countries. Interestingly, this relationship is observed only among the firms with a well-established reputation for environmental responsibility.

Keywords: Corporate Social Responsibility, Environment, Regulation, Multinationals, Reputation
JEL Codes: D22, F23, M14, Q56

*Univ. Orléans, LEO, CNRS UMR 7322, **Corresponding author**. remi.bazillier@univ-orleans.fr, Faculté de Droit d'Economie et de Gestion Rue de Blois - BP 26739 - 45067 ORLEANS Cedex 2. France. Tel: (33) (0)2 38 49 49 81. Fax: (33) (0)2 38 41 73 80.

†University of Lausanne (HEC) - DEEP, sophie.hatte@unil.ch

‡Université Paris 13 - CEPN and CNRS, julien.vauday@univ-paris13.fr

1 Introduction

Growing concerns about climate change, and more generally about the environment, have changed the way the responsibility of multinational companies is perceived. On the one hand, they are officially part of international discussions on the topic. The World Business Council for Sustainable Development aims at promoting their initiatives, while the United Nations encourages their involvement through the Global Compact, and the 2015 Cop21 Conference put a strong emphasis on firms' possible contribution towards sustainable development. On the other hand, multinational companies have also been accused of exporting their pollution to developing countries, or relocating abroad when environmental regulations become too tight (i.e. the pollution haven hypothesis (PHH)).

The literature has widely studied this pollution haven hypothesis. The theoretical background of such hypothesis is strong and convincing (Copeland & Taylor, 2004; Rauscher, 2005) but empirical evidence are much more mixed (Eskeland & Harrison, 2003; Rezza, 2015).[1] Some studies detect PHH when strategic behavior of the host countries is taken into account (Cole *et al.*, 2006; Cole & Fredriksson, 2009; Kellenberg, 2009). Ederington *et al.* (2005) suggests another explanation that does not rely on an endogeneity issue but rather on a composition effect. Environmental regulations have stronger effects on trade between industrialized and developing economies while most trade and FDI occur between industrialized countries where environmental regulations are tighter. Furthermore, more polluting industries are found to be less mobile geographically (Ederington *et al.*, 2005; Cole *et al.*, 2010), and therefore unable to relocate easily as a result of regulatory stringency.

In this paper, we add one key ingredient to the relationship between FDI and the environmental regulations, which is the environmental image of the firm. Indeed, choosing to locate activities in countries with weak environmental regulations is likely to create drawback on a firm's image. At the same time, investments in Corporate Environmental Responsibility (CER)[2]

[1] In a recent meta-analysis conducted on 26 articles on FDI and PHH, Rezza (2015) finds that evidence supporting the PHH are found in only one-third of sampled papers. Significant estimates rejecting the PHH accounts for 10% while the majority of estimates do not find any significant impact of environmental regulations on FDI.

[2] In this paper, we focus on the environmental dimension of CSR. This is why we use the term Corporate Environmental Responsibility (CER) rather than CSR. CER can be defined as the environmental dimension of CSR.

can influence the way firms are perceived and therefore contribute to changing this perception.

We exploit variations in FDI location decisions in 2009 for a sample of 551 European firms for which we can match data about their CER from *Vigeo*. By merging these data with firms economic and financial characteristics, we generate a comprehensive database whose richness allows dealing with the complex interactions at play. The specific question we address is how the environmental responsibility of a firm affects location decision among potential host countries with different levels of environmental standards. We find that firms located in countries with weak environmental regulations are also more likely to be active in CER, controlling for the traditional determinants of foreign direct investment (FDI) in all the specifications.

Interestingly, we take into account the difference between the environmental laws and the enforcement of these regulations in the host countries, by distinguishing between *de jure* and *de facto* environmental standards.[3] We therefore use several indexes reflecting either the level of national legislation or ratification of international treaties (*de jure* measures), whatever the effective level of enforcement; or the outcome of such regulations (*de facto* measures). The pattern we find is only observed in the case of *de facto* environmental standards.

Because of the information asymmetry on firms' practices, a large number of environmental treaties ratified by a country is likely to send a positive signal to consumers. If consumers are well-informed about the level of the *de jure* regulations, while they hardly have access to the information on the *de facto* standards, firms that care about their environmental image may exploit the information problems, by investing in countries with (i) bad environmental performances and (ii) good *de jure* standards.

Furthermore, we find that our results are driven by the firms with a well-established reputation for environmental responsibility. More precisely, firms whose CER increased between 2005 and 2009, that are also the ones with relatively low levels of CER in 2005, are less located in countries with weak environmental regulations. We argue that this supports the hypothesis

[3]Beyond the fact that *de jure* regulations may only give little information on the efficiency of regulations with respect to environmental quality, and when focusing on international conventions, it is essential to bear in mind that most treaties define several levels of commitment depending on the level of development. For instance, the United Nations Convention on Climate Change (UNCCC) makes a distinction between annex 1 (mostly industrialized countries and countries in transition) and non-annex 1 countries. Only annex 1 countries have binding goals in terms of GHC reduction according to the Kyoto Protocol. Therefore for non-annex 1 countries, it is not costly to ratify such a protocol, as it does not imply any binding commitments to reduce emissions.

of a reputation effect. Firms with a low reputation cannot afford the reputational cost of locating activities in countries with weak environmental regulations. Both the difference of effects between *de jure* and *de facto* regulations, as well as the heterogeneous behaviours of firms with different degrees of reputation give credit to the existence of a strategic behaviour of CER firms exploiting information problems. These theoretical mechanisms are developped in the next section of the paper.

Finally, we deal with robustness issues as well as possible omitted variable bias. First, one could argue that the standard process of globalization induces firms to first invest in countries that are geographically close and with large market potential. So this means that only the most performant firms, that are known to be the most productive ones, reach the distant and small countries. If these countries are also the "dirty" countries in our analysis, and the most productive firms are the ones with a environmental-friendly image, then we over-estimate the relationship between CER, the environmental regulations and the probability of being located in a given destination country. So we re-estimate our baseline effect including the productivity of the firm and an interaction term between the productivity and the environmental regulations. Alternatively, we count the number of countries in which the firm is located in and include this variable as well as an interaction term with the environmental regulations in the estimation. Both methods show the same pattern. The standard effect of globalization coexists with our main effect: firms viewed as environmental-friendly as well as the most productive firms are more often than others located in the "dirty" countries.

We are concerned by one last caveat, which is the potential endogeneity of the environmental regulations to the FDI of these heterogeneous firms, particularly those with a high CER score. Hence we discuss the potential direction of the bias and the consequence on our main result. We conclude that our result holds qualitatively, CER firms are indeed more located than average multinationals in low environmental regulations countries.

This analysis builds on two trends of the literature, that can bring contradictory theoretical predictions regarding the location choices of multinational firms. On the one hand, the FDI literature highlights that the major motives for locating a subsidiary abroad are accessing natural resources, reducing the costs of production or reaching a large foreign market without bearing

trade costs.[4] On the other hand, the CSR literature highlights the role of public image and reputation on a firm's profit. Arguably, firms' location strategies, in countries with stringent or poor environmental regulations, may have an impact on consumers' beliefs on a firm practices. This means that a country can be attractive in terms of its market size, access to resources or production costs but be damaging for the image of a firm that would be located there (because of the low environmental regulations).

Anecdotal evidence shows that firms may be targeted by activist groups, aiming at damaging their image, because of their location in a given country. One typical example is the call for boycotting firms using palm oil from Indonesia or Malaysia because of its strong impact on deforestation.[5] Another example is the Greenpeace campaign against Asia Pulp & paper, the leading Indonesian producer of papers and packaging, because of its responsibility over deforestation in Indonesia.[6] This latter example shows that some multinational firms had to change their location practices because of this activist threat. We can also note initiatives taken in the mining sector to define *No-Go Zones* where "responsible mining industries" should not locate.[7] This concept of *No-Go Zones* has been used by oil companies, notably Total, to define their sustainable development policy.[8] If these zones are rather limited and specific to some sectors, it highlights the possible contradiction between location choices driven by traditional determinants of FDI and the need to take into account other dimensions such as environmental responsibility.

Beyond such anectodal evidences, the literature has focused, so far, on the possible complementarity between CER and environmental standards. The assumption made in this literature is

[4] See Blonigen & Piger (2014) for a useful analysis of the main determinants of FDI identified in this literature.

[5] The San-Francisco based Rainforest Action Network (RAN) have targeted Cargill for their use of palm oil from Indonesia: *"Cargill fails to have safeguards on the palm oil they trade that would ensure to customers they are not sourcing from Tripa"* said Lindsey Allen, a RAN forest campaigner. Source: `http://news.mongabay.com/2012/`

[6] As noticed by Greenpeace, *"Many global brands suspended contracts with APP and introduced policies removing deforestation from their supply chains after a wave of public pressure inspired by Greenpeace. Over 100 companies have taken action, including Adidas, Kraft, Mattel, Hasbro, Nestlé, Carrefour, Staples and Unilever."* Source: `http://act.gp/XdGqxn`

[7] Goodland (2012) defines 5 criteria to define such *No-Go Zones*: indigenous people reserves, conflict zones, fragile watersheds, biodiversity and cultural property.

[8] Total confirmed the policy of *No-Go Zones* in its 2013 CSR report. See Total, 2013 CSR Report, p. 17, *"Confirming Off-Limits Areas"*, `http://www.total.com/sites/default/files/atoms/files/csr-report-2013.pdf`

that firms may consider their location choices as part of their CER, depending on the level of a country's standards. In other words, the "responsible" firms are viewed as being relatively more located in countries with good environmental standards. This may be a realistic assumption if CER is driven by the will to meet society's expectations or by the need to answer to interest groups' threats (see Baron (2001), which explores theoretically the main driving forces for CSR practices). This builds on public opinion concerns about investments in countries where strong environmental issues have been hinglighted. In such line, Driffield *et al.* (2013) shows that firms originating from weak institutions countries, with a low interest for CSR, are more likely to invest in conflict location. This result suggests there is, on the contrary, a "good location practices" for the best CSR firms. However, it does not deal as such with environmental issues.[9] We add to this literature by emphasizing that the multinational firms which care about their environmental image locate strategically in countries which signed a sufficient number of treaties, while having low *de facto* environmental performances.

The remainder of the paper is organized as follows. Section 2 discusses the theoretical mechanisms and testable hypotheses. Section 3 presents the empirical strategy and data. The findings and robustness checks are presented in Section 4. Finally, Section 5 concludes.

[9]Dam & Scholtens (2008) have studied the relationship between the pollution haven hypothesis and the environmental responsibility of firms. The authors show that firms exhibiting the highest environmental responsibility levels tend to locate in cleaner countries. However their empirical results can be challenged in various dimensions. They do not include major determinants of firm location, as the geographical distance or the existence of a common language between the origin and the destination country. Similarly, they do not include origin country fixed effect. This is of a concern, since a firm's decision is likely to be determined by the level of regulations in its own country (Kolk & Fortanier, 2013). While these determinants are not the primary focus of the analysis, the omitted variable bias in Dam & Scholtens (2008) is expected to be highly detrimental and make the interpretation of the results rather hard. Empirical evidence in favour of such "good location practices" for environmentally responsible firms are therefore scarce and weak.

2 Theoretical background and hypotheses

We start from the two main strategic motives for CSR practices presented in Baron (2001).[10] Either a firm will engage a CSR activity to earn profit, or to answer to a threat by an interest group. Such motives are both strategic as firms either seek to earn profit by selling their products at a higher price or to avoid an activists' group to carry out its threat. In this section, we investigate the theoretical connections between CER and location strategies and derive the corresponding testable hypotheses to bring to the data.

From the FDI literature, the theory highlights that the major motives for locating a subsidiary abroad are accessing natural resources, reducing the costs of production, or reaching a large foreign market without bearing trade costs. The first two motives are rather related to vertical FDI whereas the last two are related to horizontal FDI (the second one being common to both types of FDI). The theoretical CSR literature highlights that the public image (having a high CER score), the reputation or credibility of this image (having a high CER score for a long time) as well as the communication strategy of firms are essential.[11] These are what may convince consumers that firms are indeed committed to a certain level of CER. This level should be such that the (higher) price of a product is justified or that the activist's threat is no longer necessary.

We argue in this paper that firms' location strategies have an impact on the public image and/or the reputation of firms, hence on their communication strategy. Location strategies can therefore have an impact on consumers' perceptions of the firms CER activity and ultimately on

[10] Here, we do not consider the case of CSR driven by altruism. However, one should note that our results are also compatible with altruism-driven CSR. Baron (2001) does not necessarily mean that this altruism should be absolute or unconditional. He focuses on the society (or consumers) expectations. Consumers may have lower concerns for the environment in far countries (The "Not in My Backyard" or NIMBY problem). This hypothesis is perfectly in line with researches showing that the level of altruism is conditional to (social) distance (see the literature on social discounting and social distance in Psychology (Jones & Rachlin, 2006, 2009) and on altruism and social distance in Economics (Hoffman *et al.*, 1996; Bohnet & Frey, 1999; Leider *et al.*, 2009)). Then, firms may be more altruistic at home than abroad, implying firms could give a lower importance to CSR abroad.

[11] One should note that other social sciences such as sociology, political and management sciences provide useful theoretical frameworks to understand such relations. Legitimation theories (Campbell, 2003; Gray & Lavers, 1995) show how CSR can be part of the overall communication process required to enlist social support. Social movements and institutional changes theory (Den Hond, 2007) show how social activists may influence firms's strategies by framing a set of *institutional field "frames"* defining appropriate firms' behaviour. The threat is then the possible "*symbolic and material damage to the firm (e.g., boycotts, letter-writing campaigns, rallies)*" (Reid & Toffel, 2009) that pushes firms to take the activist groups' claims seriously. Reid & Toffel (2009) show empirically that firms which have been targeted by shareholders actions on environmental issues are more likely to publicly disclose information.

their choice either to buy or not a product or to carry out or not their threat. As a consequence, firms have to take this into account in addition to the traditional determinants the FDI literature has put forward. Clearly, both theories may yield contradictory predictions. A country can be attractive from the point of view of the FDI literature whereas the policies run in this country being damaging for the image of the firm; hence CSR theory would advise avoiding the country. How a firm would deal with the willingness to locate in a large market, for instance, if it happens to be located in a dirty country? The problem firms are facing when locating abroad is that finding (as a consumer) or providing (to the consumer) information on the real level of responsibility of a subsidiary abroad is very hard, if not impossible. We assume here that the asymmetry of information on the real behavior of the firm abroad is total. So in order to preserve its public image or its reputation of being responsible, CER firms (i.e all firms with a high level of CER) need to convince that they have good practices abroad without having the possibility to provide information on the environmental activity of their subsidiaries.[12]

CER firms have two strategies to overcome this information problem on the activity of their subsidiaries. First, they can use the regulation of the host country as a signal. Second, they can rely on their reputation as a CER firm in order to convince consumers that they act responsibly. The public information on local regulations is what we call the *de jure* regulations, i.e the environmental law as it is written. For sake of simplicity, we consider that there is no information asymmetry on *de jure* regulations. Hence, locating in a good *de jure* country is a good signal while locating in a bad *de jure* country is a bad signal. This means that high CER firms should intuitively prefer to locate in clean countries. Such a location strategy convince consumers that the firm, by complying to local environmental regulations, fully respects the environment.[13]

[12]In addition, there is also a growing literature on greenwashing (Lyon & Maxwell, 2010; Grubb, 2011) that states that firms may also use asymmetry of information to hide some bad news while publicizing good ones in order to favor their reputation and their public image. Exploiting the asymmetry of information if it is strong could be a way for some firms to reduce their costs of production by locating abroad in order to compensate the cost induced by their CSR activities at home without degrading their image/reputation. Baron (2001) acknowledges that information problems can be mitigated by the role of watchdogs, activist groups and researchers. But the asymmetry of information on real practices of firms may remain a concern.

[13]One may argue that, given that CER is commonly defined as the fact of going beyond regulations, a firm willing to maintain its CER level after locating a subsidiary abroad may prefer a low regulations country in order to outperform the local regulations. But the information asymmetry problem on the real activity of the subsidiaries remains and makes this strategy risky. So in this setup of asymmetrical information, one cannot observe a CER

Hypothesis 1 (*De jure* regulation effect) *Firms with a better environmental performance are likely to avoid investing in countries with bad de jure environmental standards. In that case, a non negative interaction effect between firms' performances and countries' de jure regulation is expected.*

However, the enforcement of such regulation may be very poor, especially in countries with low quality institutions. Consequently, the combination of good *de jure* regulations with a bad law enforcement may result in low *de facto* regulations. The important feature this paper introduces is then to distinguish between *de jure* and *de facto* regulations and to consider that whereas there is no asymmetry of information on the *de jure* regulations, there is some on the *de facto* regulations. If the asymmetry of information is strong, then locating in a good *de jure* country allows CER firms to send a good signal, even when the *de facto* regulations are bad. If the asymmetry of information on the *de facto* regulations is weak, this means that consumers receive a (noisy) information on the *de facto* regulations. Hence, when locating in a bad *de facto* country, a firm's reputation might prove helpful.

Given the assumptions made above, CER firms do not want to locate in bad *de jure* countries (despite they could be attractive from an FDI literature point of view) as the signal is very bad for sure. Then remain two types of country, the good *de jure*/good *de facto* and the good *de jure*/bad *de facto*. In the case of a good/good country, the asymmetry of information on the *de facto* regulations has no influence since both levels are identical. To the contrary, a strong asymmetry of information on *de facto* regulations is a necessary condition for following the strategy of using the local good/bad host country regulations as a signal. The possibility for consumers and/or watchdogs, if the asymmetry of information on *de facto* regulations is weak, to discover the real level of the *de facto* regulations would jeopardize the quality of the signal due to the good *de jure* regulations level.

If the asymmetry of information on *de facto* regulations is strong, some firms, the green-washers, may exploit it to dissimulate dirty behaviors. The good *de jure* level of the location country is not detrimental for their image while the bad *de facto* level in that same country allows to pollute more than the *de jure* level should allow. These firms may not be located

firm locating in a bad de jure country despite the usual definition of domestic CER.

there to reduce their costs but rather to engage in polluting activities which are important for their production process, while being very costly in terms of image if they were located in their home country. Consumers and watchdogs are not able to observe the *de facto* level, nor can they observe the real behavior of the firm. Obviously, CER firms without bad *intentions* may also choose that kind of location (especially if the FDI theory predicts they do), because consumers won't be able to discriminate between bad and good de facto countries. That story implies that greenwashers voluntarily choose countries where the gap between both types of regulations is large whereas CER firms should grant no importance to the *de facto* regulations while choosing good *de jure* countries. Importantly, FDI and CSR theories only contradicts when the country is a bad *de jure* one. Otherwise, all firms, including the CER firms whatever their intentions, can locate in an FDI attractive country.

Hypothesis 2 (Difference of effects between *de facto* and *de jure* regulations) *The interaction effect between firms' environmental performances and countries' de facto regulations is expected to be negative.*

When the asymmetry of information on the *de facto* regulations is weak and if the *de facto* level is low, this location is risky in terms of image for CER firms. Indeed, there is a risk that an activists' group or consumers find out that level of *de facto* environmental performance. This emphasizes the role of a firm's CER reputation to circumvent the information problem. Given that activists are more akin to scrutinize low CER firm, the risk is lower for high CER firms and it is much lower for firms that have a good reputation (Baron (2009)). As past environmental performances have a positive effect on the reputation, the only firms willing to take the risk of locating in such a country (for whatever reason) should then be high CER firms with a good reputation. Firms starting from a low level of environmental performances but willing to improve such performances would be less likely to exploit such information problems.

Choosing to locate in a country with a low level of *de facto* regulations necessitates having a good reputation to alleviate the doubts consumers may have on the real activity of the firms abroad and/or to reduce the risk of being investigated by an activist group. Other firms should choose to locate in good signal countries (good/good countries) if they wish to preserve or im-

prove their image or locate anywhere following uniquely the FDI literature motives for locating abroad if CER is not part of their overall strategy. Hence, in the case of CER firms that have not already acquired a good reputation, CSR and FDI theories also contradict for the good/bad countries.

Hypothesis 3 (The reputation effect) *The negative interaction effect on the de facto regulations is likely to be observed for firms with a strong CER reputation.*

We then estimate these three hypothesis empirically, and check whether our empirical strategy tackles alternative explanations.

3 Methodology and Data

3.1 Empirical Strategy

This paper aims at studying the interaction between a firm's level of environmental performance (measured by the Vigeo CER score) and national environmental standards (measured by a set of *de facto* and *de jure* indexes) to explain the location choices of European firms. In order to test the hypotheses presented above, we estimate the effect of both country-specific and firm-specific environmental practices on the location decision of a firm and the country of destination. The location decision is a discrete variable, which is equal to 1 if firm i is located in destination country d, and to 0 otherwise. Thus, the use of a probit model is particularly appropriate.[14] The probability for firm i of being located in destination country d is:

[14]We are aware that the inclusion of fixed effects in non-linear models can bias the results due to the problem of incidental parameters. However, we introduce these fixed effects to control for unobserved heterogeneity which can be important among countries and sectors. Furthermore, this bias seems to be large for samples with small T which is not the case here. Hsiao (1996) has shown that the bias can be as much as +100% for $T(i) = 2$. However, Heckman (1981) found in a Monte Carlo study that the bias was towards zero and the order of 10% when $T(i) = 8$ and $N = 100$. This result has been widely discussed. Greene (2004) showed for instance that the bias was more important even for T(i)=8, but he found that this bias decreased strongly when T increased. Also, the bias is much lower for marginal effects (on which we focus here). Fernandez-Val (2009) showed that "the bias [in average marginal effects] *is negligible relative to the true average marginal effect for a wide variety of distributions of regressors and individual effects and is identically zero in the absence of heterogeneity.*" (p.72). Considering the structure of our data, we therefore consider that the possible bias introduced by the inclusion of fixed effects is more likely to be negligible and much less problematic than the omitted variable bias and the problems of unobserved heterogeneity we will face if we do not include these fixed effects. Furthermore, as a robustness check, we ran logit regressions and obtained perfectly similar results.

$$Prob(Y_{id} = 1) = \begin{cases} 1 & \text{if} \quad \alpha CER_i + \beta Env.Std_d + \gamma CER_i \times Env.Std_d + \mathbf{Ctrl} + \epsilon_{\mathbf{id}} > \mathbf{0} \\ 0 & \text{otherwise} \end{cases}$$

where CER_i is the *Vigeo* environmental performance of firm i and $Env.Std_d$ is the environmental standard in destination country d. $CER_i \times Env.Std_d$ is the interaction between both firm-specific and destination country measures of environmental performance. We then include a vector of control variables, **Ctrl**, which aims at capturing the firm and destination country variables that influence the location decision of firm i in country d. Firm-level controls include the logarithm of total assets, operating revenues, liabilities, the number of employees, the age and the liquidity ratio of the headquarters. We control for country characteristics such as the logarithm of GDP, GDP per capita, market potential and the number of days needed to start a business. We also include origin and destination country-specific variables to control for the effect of distance and common language between both countries on the location decision of multinational firms. Finally, we alternatively control for industry-specific and origin country-specific potential omitted variables, including NACE 2-digit industry and origin country fixed effects.

If hypothesis 1 is verified, we expect a non-negative estimated coefficient on the interaction term (γ). If hypothesis 2 is verified, we expect a negative estimated coefficient (γ) to be significant when considering *de facto* measurements of environmental standards. Firms with a higher level of environmental performances would then tend to be located in countries with lower *de facto* environmental standards. If hypothesis 3 is verified, we expect a different result when considering the *evolution* of the CER index instead of the CER *level*.

3.2 Measuring the Environmental Responsibility of Firms: The Vigeo Environmental Score

To assess the level of environmental responsibility of firms, we use the data provided by Vigeo, the leading European expert in the assessment of the practices and performances of firms on social, environmental and governance issues. The Vigeo environmental rating takes the following

into account: *"the protection, safeguard, prevention of attacks on environment, implementation of an adequate managerial strategy, ecodesign, protection of biodiversity and reasonable control of environmental impacts on the overall life cycle of products and services"*.[15] These objectives are evaluated by Vigeo analysts according to 33 *principles for action*.[16] For each principle for action, they use different angles combining precise information related to (1) the leadership or the policies conducted by the firm, (2) the implementation of such policies, and (3) the results. It means that the Vigeo environmental score does not only take firm policies into account, but also the scope of such policies and above all their effective performance. It is important to notice that Vigeo states that the choice of location is not, *by itself*, a criteria in the firms rating.[17] However, Vigeo analysts aim at evaluating the social and environmental impact in all countries where firms are active and in all subsidiaries. Violations of environmental standards in one given country is therefore supposed to have a detrimental impact on the overall rating of the firm even if these violations are observed in a subsidiary far away from the headquarter.

We use the 2009 Vigeo environmental score. A high value of this index reflects a good evaluation of a firm's environmental performance. The extra-financial rating by Vigeo covers the 600 biggest European firms listed on DJStoxx600, EuroStoxx, SBF250, SBF120 or CAC40. Therefore, the span of our study is not limited to voluntary firms, which would introduce a major selection bias in the analysis.[18]

Within this 600-firm sample, we work with 551 firms for which we have data on other firm characteristics. These firm-level characteristics are presented in subsection 1.3. We observe a huge heterogeneity across these 551 multinational firms, notably across and within sectors.

[15] See `http://www.vigeo.com/` for an explanation of Vigeo's research framework.

[16] Such principles for instance include the "identification, evaluation, and reduction of the risks of environmental accidents", the "avoidance or reduction of the exploitation of sensitive ecosystems", the "reduction of water consumption", or "the effective management of energy consumption and atmospheric emissions".

[17] We have checked this point and have discussed the rating methodology with Vigeo analysts and responsibles of the method and institutional affairs department, in order to ensure that the methodology of rating is not introducing a bias of endogeneity in our study. Following these discussions, we can confirm it is not the case.

[18] Since 2003, Vigeo has also been offering audit services to firms. But these two activities (the rating which concerns all firms, and the audit which is a service provided to voluntary firms) are completely separated. Since 2010, the separation between these two activities has been formally reinforced by the creation of two distinct business brands: Vigeo rating and Vigeo enterprise. As mentioned on the Vigeo website, *"The teams dedicated to SRI research (Vigeo rating) and to audits on social responsibility (Vigeo enterprise) are clearly separated, so are their workplaces. Less than 1% of the companies rated by Vigeo rating are clients of Vigeo enterprise"*.

Table 1 presents the descriptive statistics for the whole sample and for each of the Nace 2-digit sectors. The "Transportation and Storage" sector has the highest mean score (0.43), while the "Administrative and Support Service Activities" and "Arts, Entertainment and Recreation" industries are the least responsible on average (0.279 and 0.198, respectively) when we exclude sectors with only one firm. This exemplifies that the environmental performance of firms cannot be limited to the overall level of pollution generated in the production process. The index takes into account also the effectiveness of policies to reduce the environmental impact. In other words, a firm will not be considered as environmentally responsible only because it belongs to a sector which is by definition a low-polluting sector. In order to have a high score, the firm must implement effective policies reducing its overall impact on the environment.

Table 1: Descriptive Statistics of the Environmental Vigeo Scores

Nace 2-digit Industry	Obs	Mean	Std. Dev.	Min	Max
All	551	0.336	0.17	0	0.73
Accommodation and Food Service Activities	10	0.328	0.116	0.13	0.57
Administrative and Support Service Activities	15	0.279	0.187	0	0.52
Agriculture, Forestry and Fishing	1	0.12	.	0.12	0.12
Arts, Entertainment and Recreation	5	0.198	0.18	0	0.45
Construction	25	0.400	0.129	0.15	0.73
Electricity, Gas, Steam and Air Conditioning	26	0.405	0.094	0.2	0.58
Financial and Insurance Activities	112	0.302	0.188	0	0.67
Information and Communication	55	0.321	0.175	0	0.62
Manufacturing	205	0.345	0.17	0.02	0.71
Mining and Quarrying	18	0.408	0.104	0.13	0.55
Other Service Activities	1	0.23	.	0.23	0.23
Professional, Scientific and Technical Activities	12	0.288	0.135	0.12	0.49
Public Administration and Defense	1	0.16	.	0.16	0.16
Real Estate Activities	13	0.28	0.172	0.02	0.53
Transportation and Storage	16	0.43	0.218	0.01	0.7
Water Supply, Sewerage, Waste Management	5	0.388	0.09	0.26	0.49
Wholesale and Retail Trade	25	0.331	0.144	0.05	0.59
Unclassified	6	0.317	0.126	0.14	0.48

Note: These statistics are calculated on the $Vigeo$ scores of the 551 firms for which we have data from Orbis on firm characteristics.

As we do not focus on pollution emissions only, it is legitimate to also include firms from other sectors than the manufacturing or mining ones. Service firms are also concerned by environmental issues despite low levels of emissions. Choices of location for such firms are also part of their overall environmental strategy. As an example, banks are targeted by environmen-

tal groups because of the environmental impact of their investments in some countries.[19] In the empirical analysis, we estimate within-sector (if not within-firm) regressions, which account for sector-specific environmental practices. We also run various robustness checks to ensure that our results are not driven by a specific sector. We also provide estimates excluding firms from the service sector. Therefore, we show that our results are not driven by differences between sectors but between firms *within* sectors.

Vigeo indexes are certainly among the most reliable data to measure corporate social and environmental responsibility for European firms. Igalens & Gond (2005) extensively analyze their relevance[20] and conclude that "*this benchmark constitutes a proxy that is particularly suitable for corporate social performance, at least from a theoretical point of view"* (Igalens & Gond, 2005, p. 143).[21]

3.3 Measuring National Environmental Standards

There are two main approaches to measure the stringency of environmental standards: a *de jure* and a *de facto* approach. The goal of the former is to give a quantitative assessment of the stringency of environmental laws, whereas the latter assesses the effects of environmental laws on environmental quality. If the environmental legislation is fully effective, any change in this legislation will have a direct impact on environmental quality. However, the effectiveness

[19] See for instance HSBC and Barclays, that have been subjected for a boycott call by Ethical Consumer for its involvement in the destruction of Canadian Oil Sands. See `http://www.ethicalconsumer.org/boycotts/boycottslist.aspx`

[20] More precisely, in 2000 they studied the quality of ARESE data. Vigeo was founded in 2002, acquiring the activities of ARESE. They are still using a very similar research framework.

[21] In comparison, Dam & Scholtens (2008) choose to use four indicators of EIRIS data, another extra-financial rating agency. We see two main problems using such data. First, the role of EIRIS score is to help firms improving their environmental responsibility. Their research framework clearly mentions that they *"encourage the companies to address the issues of concern to investors and to* ***improve*** *their public reporting"* (the presentation of their research is available on their website: `http://www.eiris.org/managers/our_research.html`). This raises doubts about the exogeneity of such measurement as firms may easily improve their score by following EIRIS recommendations. The second problem is the four indicators chosen by the authors: "environmental policy", "environmental management", "environmental reporting" and "environmental performance impact improvement". These indexes do not bring information about *past or current* environmental performances but only about current *policies* and *evolutions* of performance. For instance, the score for the environmental performance impact improvement is determined by the answer to the following question: "What level of improvements in environmental impact can the company demonstrate?". A firm's current overall performance cannot realistically be assessed using this question. For these reasons, we argue that Vigeo data fit better to measure current environmental performances. Furthermore, despite our requests, we were not able to obtain EIRIS data to compare it directly with Vigeo data.

of environmental policies depends on various factors. First, if the institutional framework is too weak to ensure the effective enforcement of the law, legislation will have no impact on the practices of firms and thus on environmental quality. Also, the effectiveness of such legislation can be undermined by external forces such as tax evasion (in case of environmental taxation) or a strategic behaviour of firms aiming at evading the law. Therefore, *de jure* environmental standards may not represent the real constraints which firms face. This is why we extend the analysis by focusing also on *de facto* standards. The outcome of these policies is therefore the general environmental quality.

3.3.1 Measure of *De Facto* Environmental Regulation

The goal is not to measure the stringency of environmental regulations as such, but to evaluate their real impact on environmental quality. However, environmental policies are very diverse and it is very difficult to assess their effective impact for a wide range of policies and countries. For this reason, our measure of *de facto* regulation is based on environmental quality. The underlying assumption is that environmental quality is positively influenced by the effectiveness of environmental policies.

Of course, we must notice that environmental quality is not only determined by environmental policies, but also of course by economic development among other factors. Yet, depending on the type of environmental quality under consideration, the effect will be very heterogeneous. The effect is particularly strong when focusing on the case of carbon emissions for instance.[22] For many other dimensions, economic development has the opposite effect.[23] However, for a given level of development, countries with *efficient* environmental regulations will tend to have higher environmental quality also.[24]

We use the Environmental Performance Index (EPI, 2008) built by the Yale Center for Envi-

[22] According to the environmental Kuznets curve (EKC), the effects are likely to be non-linear, but empirical evidence of such a relation is scarce, at least for carbon emissions.

[23] When considering wastes, the use of chemical products or water sanitation, economic development tends to be positively correlated with environmental quality, mainly because of the development of appropriate policies to tackle these issues. It is therefore very difficult to disentangle the effect of economic development and that of environmental policies that can be endogenous to the level of economic development.

[24] In the empirical analysis, we will also control for GDP per capital in order to take into account the income dimension of environmental quality.

ronmental Law and Policy (YCELP) and the Center for International Earth Science Information Network (CIESIN, Columbia University). It provides "*quantitative metrics for evaluating a country's environmental performance in different policy categories relative to clearly defined targets*".[25] It covers environmental health, air quality, water resource management, biodiversity and habitat, forestry, fisheries, agriculture, and climate change. The goal of this index is explicitly to "*track policy effectiveness through measurable outcomes*". Each indicator included in the EPI is associated with a policy target. These policy targets are mainly drawn from international environmental treaties, echoing our *de jure* index. To the best of our knowledge, the EPI is the most complete index measuring real environmental performances for a large sample of countries.

3.3.2 Measure of *De Jure* Environmental Regulation

A commonly accepted proxy for the level of *de jure* environmental regulation is the number of international environmental treaties ratified by a country and the number of plans or strategies adopted by a country.[26] This statistic is provided by the World Bank (World Development Indicators). Table 2 presents some descriptive statistics for these variables and Table 6 shows the correlation matrix between our two environmental standard indexes, GDP and GDP per capita. We can observe a very weak correlation between the environmental standard indexes, which justifies the use of both *de jure* and *de facto* indexes. We can also notice a weak correlation with GDP and GDP per capita. It is very close to 0 for treaties and 0.17 for the correlation between GDP per capita and the EPI. If we have a look at some selected countries (see Table 7), we can see some examples of broad disparities between the ratification of treaties and environmental performances. China for instance has ratified 11 treaties out of 12, but its EPI score is relatively low. On the contrary, Germany has only ratified 9 treaties, but its EPI score is much higher. It is noteworthy that a significant number of developing countries have excellent environmental

[25] See `http://sedac.ciesin.columbia.edu/data/set/epi-environmental-performance-index-2010` for more details.

[26] Standardized values of the number of "Participation in treaties (Climate change, Ozone Layer, CFC control, Law of the Sea, Biological diversity, Kyoto Protocol, CITES, CCD, Stockholm Convention)" and "Environmental strategies or action plans" and "Biodiversity assessments, strategies or action plans".

performances according to the EPI. Costa Rica was for instance ranked third (after Iceland and Switzerland) in 2008. The position of the United States is ambivalent. Indeed, the number of treaties it has ratified is very low, and its EPI score is fair, yet below the level observed for other developed countries. This highlights the need to use different indexes to assess the impact of environmental regulation on the location choices of firms.

Table 2: Descriptive Statistics of Environmental Indexes

Variable	Obs	Mean	Std. Dev.	Min	Max
Treaties	140	9.357143	1.383726	1	11
EPI	140	0.7196143	0.1282365	0.391	0.955

Note: Treaties is the standardized value of the number of "Participation in treaties", "Environmental strategies or action plans" and "Biodiversity assessments, strategies or action plans". It is provided by the World Bank (WB) for 2009. EPI is the Environmental Performance Index measured by the Yale Center for Environmental Law and Policy and the CIESIN, Columbia University for 2008.

3.3.3 Additional Measures of *De Jure* / *De Facto* Environmental Regulation

To assess the robustness of our results, we also provide some estimations using alternative indexes both for *de jure* and *de facto* standards. The main problem with the international treaties is the heterogeneity in their nature. Some treaties are binding (such as the Kyoto Protocol), some are not (the Ozone Layer Treaty or the 1992 Climate Change Treaty). Also, some treaties or environmental strategies are poorly connected with the stringency of regulations for firms. The link between the location of firms and the existence of a national biodiversity action plan or the country's participation in the Law of the Sea is more likely to be weak. In addition, we build two alternative indexes: the standardized value of the number of "participation in binding treaties" (CFC control, Law of the Sea, Biological diversity, Kyoto Protocol, CITES, CCD, Stockholm Convention) and the standardized value of the number of "participation in binding treaties related to air pollutants".[27] The latter variable is more likely to reflect binding constraints on firms. We will see that the results are similar when using these different indexes.

Concerning *de facto* standards, the alternative would be to focus on the subjective impact

[27]CFC control, Kyoto Protocol, Stockholm Convention

of environmental legislation on firms, based on surveys of entrepreneurs. The World Business Economic Survey (WBES) conducted by the World Bank in various countries identifies the percentage of firms considering environmental regulation as a major constraint. The problem of such a variable is that the country coverage is low, with a bias towards poor countries. Also, there are inherent margins of error associated with any single survey results that may alter the ability to compare across countries.[28]

We therefore focus on another index measuring the general environmental quality. One of the most popular aggregate indexes of environmental sustainability is the Ecological Footprint (EF). It is a measure given in global hectares measuring *"how much land and water area a human population requires to produce the resources it consumes and to absorb its wastes under prevailing technologies"'* (Wackernagel & Rees, 1996). It is provided by the Global Footprint Network (2013). [29]

3.4 Firm Location Variables

We combine our Vigeo dataset with Orbis, the ownership database provided by the Bureau van Dijk.[30] We use the procedure developed by Altomonte & Rungi (2013) to define the location of the firms in the Orbis dataset.[31] Our location variable will take the value 1 in country d if at

[28]This point is clearly mentioned in the conditions of use of the WBES.

[29]Pillarisetti & Bergh (2010) consider the case of the three most influential aggregate indexes of sustainability: the World Bank's Adjusted Net Savings measure, the Ecological Footprint and the Environmental Sustainability Index (which is the former version of the Environmental Performance Index). They discuss the main limitations and weaknesses of each of these indexes and observe that they yield conflicting results. This highlights the need to test the robustness of our results using different indexes. For our study, the main limitation of the EF is the very strong correlation with the GDP level (0.91 in our data). It can be explained by the underlying assumption in this index. As noticed by Pillarisetti & Bergh (2010), *"EF considers depletion of natural resources as the central element of sustainability. (...) EF thus suggest [sic] that scale of economic activity is perhaps most crucial of all sustainability issues"*. Our focus here is not nations' sustainability as such, but the potential impact of environmental regulation on the location choices of firms. That is why we need to isolate the effect of environmental quality from the effect of wealth. In order to do so, we propose to use the Ecological Footprint per unit of GDP for the year 2008. Alternatively, Pillarisetti & Bergh (2010) use the Adjusted Net Saving, which is a saving rate taking into account gross domestic savings, current expenditures on education, the rent from depletion of natural capacity, CO2 damage and other environmental damage. While this index may be relevant to assess the sustainability of countries, it is very difficult to justify using it in our study, as it is based on gross saving rates and also includes measures of education.

[30]Orbis covers around 100 million companies worldwide and provides information on shareholder links.

[31]Altomonte & Rungi (2013) identify all subsidiaries of parent firms by applying a definition of control as established in international standards for multinational corporations where control is assumed if the parent exceeds the majority of voting rights of the affiliate and can thus be considered as the ultimate controlling institution / ultimate beneficial owner. In order to do so, they combined ORBIS database with the Ownership Database

least one subsidiary of firm i is located in this country.

The Vigeo sample of firms represents 11.80% of the Orbis database in terms of total assets, but only 2.27% when we exclude the financial firms.[32] Table 8 shows the share of firms by sector, in our sample and in the total population of the Orbis firms. As Vigeo scores the largest firms in terms of market capitalization, some sectors (such as "Manufacturing" or "Financial and Insurance Activities") are obviously over-represented in our sample. However, these firms are also the ones that are more likely to be located abroad, which is consistent with the purpose of this paper. Furthermore, we provide a wide range of robustness checks showing that our results are not driven by one specific sector that could be over-represented in our sample of firms.

The 551 firms of the $Vigeo$ sample that are found in the Orbis database are located in 182 countries. On average, each firm has affiliates in 12 countries and the maximum number of location countries is 138. The number of firms located in each country is then very heterogeneous. It is summed up in Table 9 that shows that firms are more located in Europe than in other regions. It is completely straightforward since Vigeo is rating only European firms and we know from the FDI literature that the distance between the headquarter and potential destination countries is a large (negative) determinant of firms' location decision. The first two destination countries are the United Kingdom and the US with respectively 90% and 79% of the firms having affiliates there.

These two countries are only the 14th and 37th best countries in the EPI index. Figure 2 presents the relationship between the EPI index of country-specific environmental performance and the number of firms that have affiliates in these countries. We observe that this relationship is positive but that some very environmentally responsible countries host a very low number of firms.

provided by the Bureau Van Dijk.

[32]This can be explained by the fact that firms in the financial sector are over-represented in our sample, and those firms have very large total assets compared to firms in other sectors.

3.5 Other Control Variables

We control both for firm and country characteristics that may explain a firm's decision to locate in a given country. To define such a set of control variables, we mainly follow Blonigen & Piger (2014) whose goal is to define robust determinants of FDI. When country fixed effects are not included, we use GDP and GDP per capita to control for the size of the market. We also add a measure of market potential in the neighboring countries.[33] All these variables come from the World Development Indicators database. We also add a variable corresponding to the number of business days needed to obtain legal status to operate a firm (in 2008), from the World Bank Doing Business database. Finally, we use the distance between the country of the holding and that of the subsidiary and a dummy variable taking the value 1 when both countries share the same language. Both variables are from the CEPII (Mayer & Signago, 2006).

At the firm level, we rely on variables used by Hakkala *et al.* (2008). All variables come from Orbis. We control for the assets, the age, the operating revenue, the liabilities, the liquidity and the total number of employees.

4 Results

4.1 Estimates of the three hypotheses

Stylized fact: CER and a firm's probability to locate abroad

First, we estimate the effect of the environmental performance of a firm on the probability of locating abroad. We find that the effect of the CER index of the firm's environmental performance is positive and significant, as shown in column (1) of Table 3. This specification includes destination country, origin country, and NACE 2-digit industry fixed effects. These fixed effects aim at controlling for the omitted variable bias, taking the potential difference in the origin and destination country regulations into account, but also industry specificities that affect the location of firms. This last set of dummies allows to control for the fact that, for instance, firms in

[33] This measure was firstly proposed by Harris (1954). Country i's market potential is measured as $MP_i = \sum \frac{x_j}{d_{i,j}}$ where x_j is the GDP of country j and $d_{i,j}$ is a measure of the geographical distance between countries i and j.

the *Mining and Quarrying* sector are more often located in countries with natural resources. In column (2), we include our set of firm-level variables that control for firm characteristics influencing the location decision, such as their size and age. We also use bilateral control variables for the distance and the common language between the origin and destination country, which are known to influence firms' location decisions significantly in the FDI literature. We find that the marginal effect of the environmental performance of a firm is lower (0.0259 against 0.233), but is still positive and highly significant. This first result suggests that the environmental behaviour of a firm is a significant determinant of its location decisions.

Hypothesis 1: *de jure* regulation effect

In order to test if hypothesis 1 is observed in the data, we focus on *de jure* measurement of environmental regulations. In column (3), we then introduce an interaction term between the CER index and the *de jure* index of environmental standards: the destination country-specific number of environmental treaties ratified. Column (3) of Table 3 shows that the effect of the interaction between a firm's environmental performance and the *de jure* standards is positive but not significant. This non-significant effect of the interaction term is robust to the inclusion of a firm fixed effect, instead of the firm-level control variables and industry and origin country fixed effects (column (4)). This specification allows to ensure that our result is not driven by firm or destination country omitted variables.

In column (5), we introduce destination country variables instead of fixed effects. The goal is to be able to compute the magnitude of the interaction effect properly. In non-linear models, the magnitude is not equal to the marginal effect and can be of opposite sign. The Ai & Norton (2003) procedure is then needed to estimate these effects correctly, but we have to include the two variables composing the interaction variable in the specification. This cannot be done when we include destination country fixed effects, so we introduce the main country characteristics influencing FDI instead: GDP per capita, GDP, market potential and the number of business days needed to obtain legal status to operate a firm. Our main result holds. The interaction effect is still non-significant. The estimated impact of corporate environmental responsibility remains very stable with a positive coefficient of around 0.02. The estimated coefficient for

Table 3: Location Determinants: the Effect of CER and *De Jure* Standards

Dependent Variable	Location				
Specifications	(1)	(2)	(3)	(4)	(5)
CER	0.233***	0.0259***	0.0253***		0.0264***
	(0.00881)	(0.00822)	(0.00824)		(0.00874)
CER × # of Treaties			0.00414	0.00165	0.00804
			(0.00537)	(0.00297)	(0.00533)
# of Treaties					0.0151***
					(0.00159)
Distance		-0.0916***	-0.0916***	-0.0548***	-0.0359***
		(0.00766)	(0.00766)	(0.00497)	(0.00317)
Com. Language		0.0469***	0.0469***	0.0334***	0.0509***
		(0.00801)	(0.00801)	(0.00562)	(0.0109)
Assets		0.0128**	0.0128**		0.0131**
		(0.00592)	(0.00592)		(0.00632)
Age		0.0140***	0.0140***		0.0149***
		(0.00209)	(0.00209)		(0.00221)
Op. Revenue		0.0531***	0.0531***		0.0560***
		(0.00282)	(0.00282)		(0.00329)
Liabilities		-0.0289***	-0.0289***		-0.0300***
		(0.00508)	(0.00508)		(0.00544)
Liquidity		0.00887***	0.00888***		0.00965***
		(0.00276)	(0.00276)		(0.00298)
# of Employees		0.00425***	0.00426***		0.00443***
		(0.000467)	(0.000467)		(0.000481)
GDP per Capita					0.0152***
					(0.00235)
GDP					0.0505***
					(0.00185)
Market Potential					0.00782
					(0.00796)
# of Days					-0.00655***
					(0.00246)
Country of Origin FE	Yes	Yes	Yes	No	Yes
Country of Destination FE	Yes	Yes	Yes	Yes	No
Firm FE	No	No	No	Yes	No
Industry FE	Yes	Yes	Yes	No	Yes
Observations	47,879	47,879	47,879	47,879	47,879
Pseudo R2	0.378	0.439	0.439	0.566	0.399

Note: Robust standard errors clustered at the origin-destination country pair level in parentheses,*** significant at the 1%, ** at the 5%, and * at the 10% level. Probit estimations wih marginal effects computed at means. CER is the firm-level $Vigeo$ score of $Corporate\ Environmental\ Responsibility$. $\#\ of\ Treaties$ is the destination country-specific standardized values of the count of "Participation in treaties" and "Environmental strategies or action plans" and "Biodiversity assessments, strategies or action plans", provided by the World Bank.

the number of environmental treaties is positive and significant, suggesting that firms locate in countries with higher environmental performances. This result may invalidate the pollution

haven hypothesis, confirming the lack of robust empirical evidence of such hypothesis (Eskeland & Harrison, 2003; Rezza, 2015).[34] All other control variables have the expected sign.

Hypothesis 2: *de facto* versus *de jure* Standards

In column (1) of table 4, we introduce an interaction term between the CER index and the *de facto* index of environmental standards: the environmental performance index (EPI). We find evidence that firms with a better environmental performance are more located in countries with poor *de facto* regulations. To test the robustness of our result on the interaction term, we do not include the CER variable in column (2), and then introduce firm, destination country fixed effects and bilateral country control variables. Even in this specification that controls for firm and destination country omitted variables, the interaction term is estimated to have a negative and significant effect.

In column (3), we introduce destination country variables instead of fixed effects as in the previous set of estimates. The main result holds. The interaction effect is negative and significant, while the environmental responsibility has a positive and significant impact on the probability of locating abroad. The estimated coefficient for the EPI is positive and significant again. All other control variables have the expected sign.[35]

We calculate the estimated marginal effects for both the EPI and CER. The effect of a one standard deviation increase in the CER index on the probability that a firm be located in a given country when the EPI is at its mean (0.72) is 0.007 ($= 0.0391 \times 0.17$). Furthermore, we find that the estimated marginal effect of a one-standard-deviation increase in a firm's environmental

[34]Rezza (2015) notes that more than 10% of estimates find a significant and positive link between environmental regulation and FDI (28% when taking into account studies finding a positive but not significant link). One theoretical explanation may be given by the "Porter hypothesis" where stringent environmental regulation is found to have a positive effect on competitiveness because of the positive effect on environmental innovations.(Porter & Van der Linde, 1995). But our sample focusing on European firms, the chosen measurement of environmental regulations, or strategic behavior of states (Cole *et al.*, 2006; Cole & Fredriksson, 2009; Kellenberg, 2009) may explain this result also. In his meta-analysis, Rezza (2015) summarizes all dimensions affecting the probability to find the PHH in empirical studies on FDI.

[35]It is noteworthy that the sign of the GDP per capita coefficient has changed compared with the one obtained in Table 3. The lack of stability of the estimated effect of GDP per capita is common in the literature. Blonigen & Piger (2014) do not include it in the set of robust determinants of FDI which they elaborate. The main problem of this variable is that it reflects two dimensions: consumers' living standards, but also labor costs. Depending on the main force driving FDI, the sign of the coefficient can either be positive or negative, but this should not affect our results concerning our variables of interest. As shown in Table 6, the correlation between the EPI and GDP per capita is very low (0.17).

Table 4: Location Determinants: Difference between *De Jure* and *De Facto* Standards

Dependent Variable	Location					
Specifications	(1)	(2)	(3)	(4)	(5)	(6)
CER	0.0364***		0.0391***	0.0359***		0.0385***
	(0.00801)		(0.00869)	(0.00803)		(0.00860)
CER × EPI	-0.194***	-0.101***	-0.230***	-0.192***	-0.100***	-0.228***
	(0.0559)	(0.0335)	(0.0653)	(0.0561)	(0.0336)	(0.0639)
EPI			0.253***			0.197***
			(0.0279)			(0.0290)
CER × # of Treaties				0.00297	0.000944	0.00590
				(0.00530)	(0.00292)	(0.00521)
# of Treaties						0.0118***
						(0.00159)
Distance	-0.0901***	-0.0535***	-0.0346***	-0.0902***	-0.0535***	-0.0339***
	(0.00757)	(0.00493)	(0.00333)	(0.00757)	(0.00494)	(0.00308)
Com. Language	0.0462***	0.0328***	0.0552***	0.0462***	0.0328***	0.0546***
	(0.00792)	(0.00552)	(0.0115)	(0.00792)	(0.00552)	(0.0110)
Assets	0.0127**		0.0128**	0.0127**		0.0127**
	(0.00585)		(0.00616)	(0.00585)		(0.00612)
Age	0.0138***		0.0145***	0.0138***		0.0143***
	(0.00205)		(0.00214)	(0.00205)		(0.00213)
Op. Revenue	0.0524***		0.0548***	0.0524***		0.0542***
	(0.00279)		(0.00331)	(0.00278)		(0.00325)
Liabilities	-0.0286***		-0.0294***	-0.0286***		-0.0291***
	(0.00502)		(0.00531)	(0.00502)		(0.00527)
Liquidity	0.00884***		0.00955***	0.00884***		0.00945***
	(0.00273)		(0.00292)	(0.00273)		(0.00288)
# of Employees	0.00424***		0.00436***	0.00424***		0.00431***
	(0.000463)		(0.000469)	(0.000464)		(0.000465)
GDP per Capita			-0.00512*			0.00259
			(0.00297)			(0.00313)
GDP			0.0526***			0.0503***
			(0.00193)			(0.00180)
Market Potential			0.00713			0.00720
			(0.00795)			(0.00778)
# of Days			-0.0105***			-0.00747***
			(0.00251)			(0.00238)
Country of Origin FE	Yes	No	Yes	Yes	No	Yes
Country of Destination FE	Yes	Yes	No	Yes	Yes	No
Firm FE	No	Yes	No	No	Yes	No
Industry FE	Yes	No	Yes	Yes	No	Yes
Observations	47,879	47,879	47,879	47,879	47,879	47,879
Pseudo R2	0.439	0.566	0.399	0.439	0.566	0.402

Note: Robust standard errors clustered at the origin-destination country pair level in parentheses,*** significant at the 1%, ** at the 5%, and * at the 10% level. Probit estimations with marginal effects computed at means. CER is the firm-level $Vigeo$ score of $Corporate\ Environmental\ Responsibility$. $\#\ of\ Treaties$ is the destination country-specific standardized values of the count of "Participation in treaties (Climate change, Ozone Layer, CFC control, Law of the Sea, Biological diversity, Kyoto Protocol, CITES, CCD, Stockholm Convention)" and "Environmental strategies or action plans" and "Biodiversity assessments, strategies or action plans", provided by the World Bank. EPI is the destination country-specific $Environmental\ Performance\ Index$ provided by the Yale Center for Environmental Law and Policy (YCELP) and the Center for International Earth Science Information Network (CIESIN), Columbia University.

responsibility on its probability of locating in a country decreases with the country's EPI. More precisely, the positive estimated marginal effect of the CER index becomes negative for countries with an EPI score of 0.89 or more. The first country that has an EPI score greater than 0.89 is Costa Rica (0.905). The group of countries for which the marginal effect of the CER index is negative represents 3.6% of our 140-country sample. Furthermore, 4 of the 5 countries in that group which are above the threshold are located in Europe.

Finally, we introduce jointly the number of treaties and the EPI in columns (4) to (6). The results are not affected by the common inclusion of both variables of countries' environmental standards. The interaction is still not significant for $CER \times \#\, of\ Treaties$, while it is negative and significant for $CER \times EPI$. This last result confirms the heterogeneous effect of *de jure* and *de facto* standards. It is worth noticing that the estimated effect of national standards remains positive and significant both for the number of treaties and the EPI. All other control variables keep the same sign and significance.

All in all, we find that *de facto* environmental standards have a negative and significant effect on the way environmental responsibility impacts firms' location choices, which validates our second hypothesis. The strategic behaviour of firms with good CER investing relatively less in countries with high environmental standards is only possible when considering *de facto* standards, as these latter are more difficult to observe by consumers and activist groups. As far as formal regulations are concerned, sensitivity of CER firms about environmental standards are not different from other firms.

Hypothesis 3: the reputation effect

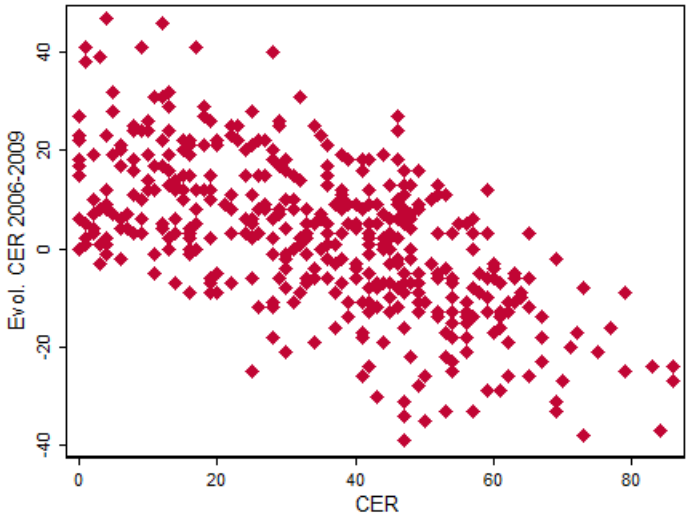
The last hypothesis relates to a possible *reputation effect*. As stated by Baron (2009), firms with good reputation are less likely to be scrutinized by activist groups and demands of these groups tend to be lower. We assume that firms with good environmental performances benefit from a good reputation. A good performance *today* is the result of efficient environmental investments and policies started in the *past*. The consequence of such assumption is that it will take time for a firm investing in green policies to improve her performance.

If firms with good performances today benefit from a better reputation, they can adopt more

risky location choices strategy because of a lower likehood of activists scrutinity. On contrary, firms starting new policies of CER may be more cautious as public scrutinity will be higher. Therefore, firms may have a different behaviour in their location choices in their first stage of CER improvement.

In order to test this idea, we now focus on the *evolution* of the Vigeo environmental scores of the firms in our sample and estimate how it affected the location decisions of these firms. As shown in figure 1, evolution of CER between 2005 and 2009 is negatively correlated with the initial level of CER in 2005 and the level of correlation is relatively high (-0.61). It is easier for a firm with a low initial performance to increase its CER. We can reasonably assume that the marginal cost of improving CER is increasing with the CER, which hence explains such strong negative relation between initial CER and the evolution. There is a process of partial convergence between environmental performances of firms: standard deviation of CER was 20 in 2005 against 15 in 2009.

Figure 1: Evolution of CER 2005-2009 and CER in 2005



Note: This Figure plots the evolution of CER between 2005-2009 and the CER index in 2005. Both data are from VIGEO

Our hypothesis is that firms with high initial level of CER benefit from a relatively stronger reputation explained by their better performances in the past. On contrary, firms that showed a significant improvement of their CER cannot benefit from this reputation effect as their past performances were low.

Columns 1 to 3 in Table 5 replicate our main specifications (columns 3 to 5 in Table 3), but they explain the location decisions by the evolution of each firm's CER index between 2005 and 2009 ($CER\ evolution$)[36], instead of the CER index in 2009. We also use an interaction term between this $CER\ evolution$ variable and the EPI destination country-specific measure of environmental performance. We find no significant effect of the $CER\ evolution$ index and of the interaction term. Nevertheless, note that the signs of the estimated (nonsignificant) coefficients are the opposite of those we find when using the CER index in 2009. Then, we create a dummy that is equal to 1 if the $CER\ evolution$ index is positive, and 0 otherwise. This variable captures whether the firm experienced a positive or a negative evolution of its environmental performance between 2005 and 2009. Columns 4 to 6 of Table 5 show the results of the estimation using this dummy variable of the environmental performance evolution. We find that the $CER\ evolution$ still does not affect firm location decisions. However, we do find a positive and significant effect of the interaction term: firms that have a better CER score in 2009 than in 2005 are less located in dirty countries. Firms improving their CER cannot use the same strategic behaviour than firms which already benefit from a good reputation. They have to take into account the risk of reputation that could follow investments in countries with poor environmental performances.

4.2 Alternative interpretations

Our interpretation relies on the role of public image and reputation in the location decisions of firms. However, one could suggest other interpretations, especially because this analysis is run in cross-section. First, high-rank CER firms may also be large global firms with a high level of productivity. If this is the case, we could capture the standard story of firms' globalization, i.e. when becoming more productive, firms invest in countries that are difficult to reach (distant or small countries), and these countries may well be the ones classified as "dirty". Second, environmental regulations are presumably positively correlated with the general institutional environment and we may then overestimate the effect of the environmental regulations.

[36] $CER\ evolution$ is measured by the difference between the CER index in 2009 and the CER index in 2005: $CER\ evolution = CER_{2009} - CER_{2005}$.

Table 5: Environmental Responsibility Evolution (2005 - 2009) and Location Decision

Dependent Variable	Location					
Explanatory variables: ($CER\ Evolution$)	Evolution : $CER_{2009} - CER_{2005}$			Dummy variable $X = 1$ if Evolution Ratio > 1 $X = 0$ otherwise		
Specifications	(1)	(2)	(3)	(4)	(5)	(6)
CER Evolution	0.0207***		0.0214***	-0.00140		-0.00190
	(0.00498)		(0.00544)	(0.00318)		(0.00348)
CER Evolution × EPI	0.0356	0.0327	0.0294	0.0668***	0.0280*	0.0744**
	(0.0415)	(0.0256)	(0.0476)	(0.0254)	(0.0165)	(0.0303)
EPI			0.265***			0.219***
			(0.0331)			(0.0385)
Distance	-0.0973***	-0.0643***	-0.0360***	-0.0973***	-0.0642***	-0.0360***
	(0.00890)	(0.00599)	(0.00364)	(0.00886)	(0.00597)	(0.00365)
Com. Language	0.0544***	0.0415***	0.0611***	0.0543***	0.0415***	0.0610***
	(0.00902)	(0.00677)	(0.0129)	(0.00902)	(0.00676)	(0.0129)
Assets	0.0195***		0.0198***	0.0206***		0.0209***
	(0.00715)		(0.00734)	(0.00711)		(0.00732)
Age	0.0130***		0.0135***	0.0136***		0.0141***
	(0.00258)		(0.00266)	(0.00257)		(0.00265)
Op. Revenue	0.0454***		0.0466***	0.0458***		0.0471***
	(0.00351)		(0.00390)	(0.00351)		(0.00389)
Liabilities	-0.0210***		-0.0214***	-0.0225***		-0.0229***
	(0.00620)		(0.00640)	(0.00618)		(0.00639)
Liquidity	0.0147***		0.0151***	0.0147***		0.0151***
	(0.00367)		(0.00379)	(0.00368)		(0.00379)
# of Employees	0.00308***		0.00305***	0.00322***		0.00319***
	(0.000514)		(0.000519)	(0.000516)		(0.000520)
GDP per Capita			-0.00652*			-0.00651*
			(0.00345)			(0.00346)
GDP			0.0595***			0.0595***
			(0.00207)			(0.00209)
Market Potential			0.0195**			0.0199**
			(0.00879)			(0.00876)
# of Days			-0.0105***			-0.0106***
			(0.00290)			(0.00290)
Country of Origin FE	Yes	No	Yes	Yes	No	Yes
Country of Destination FE	Yes	Yes	No	Yes	Yes	No
Firm FE	No	Yes	No	No	Yes	No
Industry FE	Yes	No	Yes	Yes	No	Yes
Observations	37,859	37,859	37,859	37,859	37,859	37,859
Pseudo R2	0.445	0.563	0.401	0.445	0.563	0.401

Note: Robust standard errors clustered at the origin-destination country pair level in parentheses,*** significant at the 1%, ** at the 5%, and * at the 10% level. Probit estimations with marginal effects computed at means. CER Evolution is computed as $CER_{2009} - CER_{2005}$ in specifications 1 to 3. In specifications 4 to 6, CER Evolution is a dummy variable that is equal to 1 when $CER_{2009} - CER_{2005} > 0$ and 0 otherwise.

Does productivity drive the CER effect?

We are concerned by the fact that firms with high level of CER may also be the most productive firms. Since the most productive firms are known to be located in a larger number of countries,

it may increase mechanically their probability to be located in the "dirty" countries.

Two factors reinforce this suspicion. First, firms' size is an important determinant of CSR (Siegel & Vitalino, 2007). As size and productivity are positively correlated (Bartelsman & Doms, 2000; Leung *et al.*, 2008), the high-rank CER firms may well be the most productive firms. Second, productivity is an important determinant of firms' foreign activities. Helpman *et al.* (2004) show that only the most productive firms engage in foreign activities (trade or FDI) and that only the most productive ones among them engage in FDI. Moreover, Chen & Moore (2010) shows that, among the firms operating in foreign markets, the top of the productivity distribution serves the tough countries, that are likely to be the "dirty" countries in our analysis. As we also observe that CER firms are more likely to be located abroad, we may capture a coincident factor, and not a direct impact of CER on firms' location choices.

One should note that we already control for various proxies of firms' size: the level of assets, the operational revenue and the number of employees. Second, the negative interaction term we found is robust to the inclusion of firms fixed effects, which control for unobservable characteristics at the firm-level, as productivity (see column 4 of table 3). However, none of the specifications presented so far allows to control for the interaction between productivity and the environmental regulations in the destination country.

We then estimate each firm's level of productivity from the Cobb-Douglas production function, controlling for industry fixed-effects:

$$Y_i = \alpha_0 + \alpha_L Labor_i + \alpha_K Capital_i + \alpha_M MaterialInputs_i + \mathbf{FE}_s + \epsilon_i \qquad (1)$$

where Y is the log of value added, $Labor$ is the log of the number of employees, $Capital$ is the log of the dollar value of physical capital and $Material\ Inputs$ the log of the dollar value of the material inputs. α_L, α_K and α_M are the input elasticities of labor, capital and material. Between two firms with the same inputs $Labor$, $Capital$ and $Material$, the firm with the higher output Y is said to have a higher measured total factor productivity (TFP), which is measured by $exp(\alpha_0 + \epsilon)$. We then obtain a proxy of productivity for all firms of our sample.

The correlation between a firm's productivity and its environmental score (CER) is rather

weak (0.25), which suggests that a firm's environmental behavior is not fully driven by its productivity. Going further, we include the productivity of the firm and an interaction term between the productivity and the environmental regulations in the destination country. Results are presented in Table 11. We find a positive correlation between firm's productivity and the probability of being located abroad, which is consistent with the literature on heterogeneous firms and FDI (Helpman *et al.*, 2004). The interaction between firm's productivity and EPI is negative. The most productive firms are more located than others abroad, and they are also more likely to be located in countries with low environmental regulations. Importantly, even after controlling for the possible influence of productivity, we still find a negative interaction effect between firm's CER and *de facto* environmental regulation (columns 1 and 3). This specification does not affect the non-significant effect of the interaction term between CER and the number of treaties on the location decision of firms (columns 2 and 3).

We then reproduce this exercise but using the number of destination countries served by the firm instead of its productivity. We find exactly the same pattern: the most globalized firms are more located in the dirty countries than the other firms, as well as the firms that have a high level of CER (columns 4 to 6).

Are our results driven by large global firms with high CER and affiliates in many countries?

Finally, we run another exercise to show that our result is not driven by firm's globalization from clean to dirty countries. We estimate the effect of CER x EPI on different subsamples, based on the distribution of the number of destination countries in which the firms have foreign affiliates (Table 12). As these firms are also likely to be the most productive, it is another way to test that productivity does not drive the CER effect. We find that our main result is driven by the least globalized firms, defined as the firms that have foreign affiliates in a number of countries that is below the average (columns 1 and 2). Moreover, we even find that the first quartile of firms drive our result (columns 3 to 6). We take this evidence with a grain of salt as the number of observations decreases significantly in these specifications.

Are we capturing the effect of a broader institutional framework?

Another concern comes from the idea that firms location decision is likely to be influenced by other institutional factors, correlated with the level of environmental regulation. This is a concern since our interpretation relies on the effect of environmental regulations on the public image of firms investing in these countries. If this assumption is verified, it is straightforward to explain how environmental regulations may have an heterogeneous impact on firms' location decision, depending on their level of *environmental* responsibility. But if our proxy of environmental regulation also captures the level of a broader institutional framework, it will be difficult to explain why CER firms invest more or less in countries with different level of institutions. In order to take into account this possible drawback, we include various dimensions of the institutional framework in our empirical analysis. More precisely, we use the ICRG index of governance and various indexes from the Worldwide Governance Indicators Project (Kaufmann *et al.*, 2010): regulatory quality, rule of law, investment protection, corporate tax rate, and corruption.[37] Table 13 shows that the correlation between the different institutional variables is relatively high. Quality of regulation, rule of law and ICRG index seem redundant as the correlation is very high (around 0.9). That is why we choose to test the influence of institutions by including these variables one by one. EPI is positively correlated with all variables, except corporate tax rate. Correlation is included between -0.2175 and 0.6422. Correlation between the number of treaties and all institutional variables is very weak.

Results are given in table 14. The idea is to include conjointly one institutional variable and our proxy of environmental regulation. We then check that the interaction between CER and environmental regulation is still negative. Globally, we find that firms are more likely to be located in countries with good institutional framework, whatever is the proxy of institutions chosen (except when considering the corporate tax rate where the effect is not significant). Then, our results concerning EPI, CER and the interaction variable are perfectly similar. It suggests that our variable of environmental regulation does not capture the general quality of institutions but a specific environmental dimension. It validates our interpretation of the negative interaction effect between countries' environmental regulation and firms' environmental responsibility.

[37] All variables are available from the *Quality of Governance Database*: `http://www.qog.pol.gu.se/`.

4.3 Other Robustness Checks

Alternative Indexes of National Standards

To test the robustness of our results, we use alternative indexes of countries' environmental performances in our estimations. We first use other measures of the treaties to check the robustness of the null effect of CER x $\#\ of\ Treaties$. We use the "air pollutant treaties" and the "binding treaties" and find perfectly similar results, confirming hypothesis 1.[38]

To check the robustness of the effect of the *de facto* regulations, we proxy environmental standards by environmental quality using the Global Ecological Footprint. We divide the Global Ecological Footprint by the level of GDP to disentangle the effect of environmental quality from a pure wealth effect. Our results are given in table 15, using the same specifications as in the previous sets of estimates. Contrary to EPI, a higher value of the Ecological Footprint indicates a lower level of environmental quality. The sign of our estimated coefficients should therefore be interpreted the other way than in our previous estimates.

The estimated coefficient of the interaction term is positive and significant in the three specifications. Our results are in line with those obtained using the EPI as a proxy for environmental standards, which confirms their robustness. The impact of CER on the probability of locating abroad is still estimated to be positive. Our main result remains valid: the interaction effect between national standards and firm performances is negative, confirming hypothesis 2.[39]

An alternative measure of *de facto* regulations we could use is WBES. However, problems of international comparability mentioned in the conditions of use of this database make us unconfident that we could capture any relevant effect with this variable. Moreover, the poor geographical coverage of this variable decreases the size of our sample drastically.

Sectorial and Geographical Robustness Checks

As mentioned above, the firms in our sample belong to very different sectors. We take potential biases driven by sectorial heterogeneity seriously since we use sector-fixed effects when firm

[38] Results are available upon request.

[39] However, in the third specification, the Ecological Footprint coefficient is positive, in contradiction with what was found using the EPI. This last result denotes the difficulty to isolate the effect related to the pollution haven hypothesis.

fixed-effetcs are not included in all our estimates. In addition, we check whether some particular sectors could drive our results (see table 16). In column (1), we estimate the same specification as in column (3) of Table 3, but we restrict our sample to firms that do not belong to the *Mining and Quarrying* sector. The goal is to focus on footloose sectors. Ederington *et al.* (2005) explains the difficulty to test the pollution haven hypothesis by heterogeneous mobility costs among sectors and shows that location in footloose sectors are more likely to be sensitive to the level of environmental regulation. We cannot build a fine topology of sectors with our data but we can exclude sectors which are by definition not mobile (the *Mining and Quarrying* sector). Location in such sector is clearly constrained by the location of natural ressources. Arguably, our results are robust: the positive and significant effect of the firm-specific CER index and the negative and significant effect of the interaction term hold.

We replicate this exercise excluding firms of the *Finance and Insurance Activities* sector (column 2), and then all firms in the service sector (column 3). We define the service sector as firms belonging to "Accommodation and Food Service Activities", "Administrative and Support Service Activities", "Financial and Insurance Activities", "Information and Communication", "Professional, Scientific and Technical Activities", "Public Administration and Defense" and "Other Service Activities". The results are also qualitatively the same.

We also test the robustness of our results replicating this exercise by excluding one by one each other sectors. We find that the results obtained with both *de jure* and *de facto* measures of environmental standards hold in all of these specifications.

We run similar exercises, but testing whether our results are driven by firms coming from or going to some specific countries. We thus exclude firms from a given origin country from our sample each time, and find that our results still hold in each of the specifications (see Table 17). Finally, we run regressions excluding destination countries by regions. We consider 12 groups of countries here, defined on a geographical basis.[40] In the case of *de jure* standards, our result holds for all specifications. However, we find that in the case of *de facto* standards, our results are robust in all of these specifications, except for the specification which excludes

[40]We classify countries as belonging to one of the following groups: Europe, North America, South America, Central America, Middle East, Northeast Asia, Southeast Asia, South Asia, Central Asia, North Africa, Rest of Africa and Pacific.

Europe from the list of the potential destination countries (see Table 18). In this case, the effect of the environmental performance of firms is not estimated to be conditional on destination country regulations. This could be explained by the fact that most of the countries for which the effect of the EPI becomes negative are located in Europe.

Finally, we also test the robustness of our results using alternative estimators. All of these results are robust when we use logit or nested logit estimations, and when we run the Ai & Norton (2003) procedure.

4.4 The case for endogeneity

A last concern about our result is related to the possible endogeneity between FDI and the level of environmental regulations. The PHH literature has for instance put forward that FDI by their mere presence may affect the level of environmental regulations. We therefore discuss the potential biais an endogeneity issue would induce and then conclude whether this biais actually weakens the credibility of our result or not.

The first endogeneity issue that has been emphasized in the literature is that FDI, once they have been undertaken, have a positive effect on the level of the environmental regulations. The reason could either be direct, foreign firms that invest abroad are cleaner than local firms and then seek to improve the level of the regulations in order to alleviate the local competition, or indirect through the positive effect of FDI on the GDP which in turn yields an increase in the demand for more stringent environmental regulations (Cole *et al.*, 2006; Cole & Fredriksson, 2009). If investments of foreign firms, whatever their level of CER, have a positive impact on national regulations, the effect of CER firms (which are supposed to be cleaner) should be stronger. In these cases, the presence of endogeneity implies that we underestimate the effect.

Second, one could argue that investments by CER firms could on the contrary weaken the level of environmental regulations. This may occur if CER firms lobby government in order to reduce their production costs (See for instance Cole & Fredriksson, 2009; Konisky, 2007). While we cannot rule out this possibility, we do not consider it as an issue. Indeed, this would mean that what fragilizes the quality of our result, that high CER firms choose to locate more than other firms in "dirty" countries, is the fact that high CER firms seek to reduce the level

of the environmental regulations. The objective of these firms remains the same: facing low environmental regulations. In other words, this possible endogeneity bias simply prevents us from deciding between two means (location choice or lobbying) to reach the same outcome: producing in a low environmental regulation country.

To conclude on endogeneity, since we cannot fully tackle the issue, we cautiously interpret the relationships we estimate as robust correlations. We however are confident that endogeneity would not weaken our main result. Either the potential endogeneity would reinforce our main result or, if it were to fragilize it, the explanation would be that high CER firms lobby (successfully) the host government to decrease the stringency of the environmental regulations. Qualitatively, the result remains the same: CER firms are indeed intentionally more located in countries with low de facto regulation than the other multinationals.

5 Discussion and Conclusion

In this paper, we find that firms with good environmental performances tend to be located in "dirtier" countries, at least when considering *de facto* national performances in terms of environment. More precisely, we show that national environmental performances downgrade any positive effect which the environmental responsibility of firms may have on their probability of being located abroad. This result is robust to various specifications.

The idea of a negative interaction effect between firms' environmental performances and countries' environmental standards is based on a possible strategic behaviour of firms trying to maintain their profitability level while investing in CER and/or preserving their public image at the global scale taking into consumers' expectations or differences in the likelihood of activists' threat. All these behaviours are compatible with the three visions of CSR suggested by Baron (2001). The two key elements firms may use to act strategically are information problems and limited altruism.

It is worth noticing that the negative interaction term which we found between CER and national standards is only significant when considering *de facto* standards, but not when considering *de jure* ones. One may think that being located in countries with very weak environmental

legislation is counterproductive for a firm with good environmental performances. However, as it is much more complicated to observe a country's real environmental performance, this limitation is raised for countries which have good environmental legislation, but enforce it poorly. One possible explanation is that firms which invest in dirty countries must have a higher level of CER to minimize the risk of reputation loss. This idea is supported by the positive interaction we found between the CER *improvement* of firms and the environmental regulations. As firms improving their environmental performances are also the ones that had the lowest initial level, these firms have to be more cautious because of their will to increase their reputation.

We argue that the difference of behaviours towards *de jure* and *de facto* regulations and between firms with different reputation are key elements supporting our idea of a strategic behaviour for firms with good environmental performances. This strategic behaviour is not always possible and relies on information asymmetry, heterogeneous levels of public scrutinity, and the reputation of the firm.

These results also suggest that a key driver for CER is the will to protect or improve public image and reputation of firms. It should encourage further researches on the *international dimension* of public disclosure and communication related to CER. As strategic behaviour are more likely to appear, the scrutinity role of consumers through activists' group should be encouraged. But public actors should also encourage transparency and provide the legal framework ensuring verifiable disclosures of firms, not only in their origin countries but also in all countries they are investing in.

Acknowledgments: We would like to thank Vigeo which provided us with the data on the level of Corporate Social Responsibility. A partnership agreement which includes the present paper has been signed between Vigeo and the LEO (University of Orléans). We also would like to thank Mathieu Couttenier, Farid Toubal and José de Sousa for their comments and advice, Carlo Altomonte and Armando Rurgi for providing us with Orbis data, and the Global Footprint Network for data on the ecological footprint.

References

Ai, Chunrong, & Norton, Edward C. 2003. Interaction terms in logit and probit models. *Economics Letters*, **80**(1), 123–129.

Altomonte, Carlo, & Rungi, Armando. 2013 (June). *Business groups as hierarchies of firms: determinants of vertical integration and performance*. Working Paper Series 1554. European Central Bank.

Baron, David P. 2001. Private Politics, Corporate Social Responsibility, and Integrated Strategy. *Journal of Economics & Management Strategy*, **10**(1), 7–45.

Baron, David P. 2009. A Positive Theory of Moral Management, Social Pressure, and Corporate Social Performance. *Journal of Economics & Management Strategy*, **18(1)**, 7–43.

Bartelsman, Eric J., & Doms, Mark. 2000. Understanding Productivity: Lessons from Longitudinal Microdata. *Journal of Economic Literature*, **38**(3), 569–594.

Blonigen, Bruce A, & Piger, Jeremy. 2014. Determinants of foreign direct investment. *Canadian Journal of Economics/Revue canadienne d'économique*, **47**(3), 775–812.

Bohnet, Iris, & Frey, Bruno S. 1999. Social Distance and Other-Regarding Behavior in Dictator Games: Comment. *American Economic Review*, **89**(1), 335–339.

Campbell, D. 2003. Intra- and Intersectoral Effects in Environmental Disclosures: Evidence for Legitimacy Theory? *Business Strategy and the Environment*, **12(6)**, 357–371.

Chen, Maggie Xiaoyang, & Moore, Michael O. 2010. Location decision of heterogeneous multinational firms. *Journal of International Economics*, **80**(2), 188–199.

Cole, Matthew A., & Fredriksson, Per G. 2009. Institutionalized pollution havens. *Ecological Economics*, **68**(4), 1239–1256.

Cole, Matthew A., Elliott, Robert J. R., & Fredriksson, Per G. 2006. Endogenous Pollution Havens: Does FDI Influence Environmental Regulations? *Scandinavian Journal of Economics*, **108**(1), 157–178.

Cole, Matthew A, Elliott, Robert JR, & Okubo, Toshihiro. 2010. Trade, environmental regulations and industrial mobility: An industry-level study of Japan. *Ecological Economics*, **69**(10), 1995–2002.

Copeland, Brian R., & Taylor, M. Scott. 2004. Trade, Growth, and the Environment. *Journal of Economic Literature*, **42**(1), 7–71.

Dam, Lammertjan, & Scholtens, Bert. 2008. Environmental regulation and MNEs location: Does CSR matter? *Ecological Economics*, **67**(1), 55–65.

Den Hond, F abd de Bakker, FGA. 2007. Ideologically motivated activism: how activist groups influence corporate social change activities. *Academy of Management Review*, **32(3)**, 901–924.

Driffield, Nigel, Jones, Chris, & Crotty, Jo. 2013. International business research and risky investments, an analysis of FDI in conflict zones. *International Business Review*, **22**(1), 140 – 155.

Ederington, Josh, Levinson, Arik, & Minier, Jenny. 2005. Footloose and Pollution-Free. *The Review of Economics and Statistics*, **87**(1), 92–99.

EPI. 2008. *2008 Environmental Performance Index (EPI)*. Yale Center for Environmental Law and Policy (YCELP)/Yale University, Center for International Earth Science Information Network (CIESIN)/Columbia University, World Economic Forum (WEF), Joint Research Centre (JRC)/European Commission. 2010. Palisades, NY: NASA Socioeconomic Data and Applications Center (SEDAC). http://sedac.ciesin.columbia.edu/data/set/epi-environmental-performance-index-2010.

Eskeland, Gunnar S., & Harrison, Ann E. 2003. Moving to greener pastures? Multinationals and the pollution haven hypothesis. *Journal of Development Economics*, **70**(1), 1–23.

Fernandez-Val, Ivan. 2009. Fixed effects estimation of structural parameters and marginal effects in panel probit models. *Journal of Econometrics*, **150**(1), 71–85.

Global Footprint Network. 2013. *National Footprint Accounts, 2011 Edition*.

Goodland, Robert. 2012. *Responsible Mining: The Key to Profitable Resource Development. Defining "Best Practice Responsible Mining"*. Tech. rept. Institute for Environmental Diplomacy and Security, University of Vermont. Research Series: A1-2012-4.

Gray, R., R. Kouhy, & Lavers, S. 1995. Corporate Social and Environmental Reporting: A Review of the Literature and a Longitudinal Study of UK Disclosure. *Accounting, Auditing & Accountability Journal*, **8(2)**, 47–77.

Greene, William. 2004. Fixed Effects and Bias Due to the Incidental Parameters Problem in the Tobit Model. *Econometric Reviews*, **23**(2), 125–147.

Grubb, Michael D. 2011. Developing a Reputation for Reticence. *Journal of Economics & Management Strategy*, **20**(1), 225–268.

Hakkala, Katariina Nilsson, Norbï£¡ck, Pehr-Johan, & Svaleryd, Helena. 2008. Asymmetric Effects of Corruption on FDI: Evidence from Swedish Multinational Firms. *The Review of Economics and Statistics*, **90**(4), 627–642.

Harris, Chauncy D. 1954. The Market Factor in the Localization of Industry in the United States. *Innals of the Association of American Geographers*, **64**, 315–348.

Heckman, J.J. 1981. The incidental parameters problem and the problem of initial conditions in estimating a discrete-time data stochastic process. *In:* Manski, C.F., & McFadden, D. (eds), *Structural Analysis of Discrete Data with Econometric Applications*. New York: MIT Press.

Helpman, Elhanan, Melitz, Marc J., & Yeaple, Stephen R. 2004. Export Versus FDI with Heterogeneous Firms. *American Economic Review*, **94**(1), 300–316.

Hoffman, Elizabeth, McCabe, Kevin, & Smith, Vernon L. 1996. Social Distance and Other-Regarding Behavior in Dictator Games. *The American Economic Review*, **86**(3), pp. 653–660.

Hsiao, C. 1996. Logit and probit models. *In:* Matyas, L., & Sevestre, P. (eds), *The Econometrics of Panel Data: Handbook of Theory and Applications. Second Revised Edition*. Dordrecht: Kluwer Academic Publishers.

Igalens, J., & Gond, J.P. 2005. Measuring Corporate Social Performance in France: A Critical and Empirical Analysis of ARESE Data. *Journal of Business Ethics*, **56(2)**, 131–148.

Jones, Bryan, & Rachlin, Howard. 2006. Social Discounting. *Psychological Science*, **17**, 283–286.

Jones, Bryan, & Rachlin, Howard. 2009. Altruism among relatives and non-relatives. *Behavioural Processes*, **79**, 120–123.

Kaufmann, Daniel, Kraay, Aart, & Mastruzzi, Massimo. 2010 (Sept.). *The Worldwide Governance Indicators: Methodology and Analytical Issues*. SSRN Scholarly Paper. Social Science Research Network, Rochester, NY.

Kellenberg, Derek K. 2009. An empirical investigation of the pollution haven effect with strategic environment and trade policy. *Journal of International Economics*, **78**(2), 242–255.

Kolk, A., & Fortanier, F. 2013. Internationalization and Environmental Disclosure: the Role of Home and Host Institutions. *Multinational Business Review*, **21**(1), 87–114.

Konisky, David M. 2007. Regulatory Competition and Environmental Enforcement: Is There a Race to the Bottom? *American Journal of Political Science*, **51(4)**, 853–872.

Leider, Stephen, Mobius, Markus M., Rosenblat, Tanya, & Do, Quoc-Anh. 2009. Directed Altruism and Enforced Reciprocity in Social Networks. *The Quarterly Journal of Economics*, **124**(4), 1815–1851.

Leung, Danny, Meh, Cesaire, & Terajima, Yaz. 2008. *Firm Size and Productivity*. Working Papers 08-45. Bank of Canada.

Lyon, Thomas P., & Maxwell, John W. 2010. Greenwash: Corporate Environmental Disclosure under Threat of Audit. *Journal of Economic & Management Strategy*, **Forthcoming**, –.

Mayer, T., & Signago, S. 2006. *Note on cepii's distances measures*. mimeo.

Pillarisetti, J., & Bergh, Jeroen. 2010. Sustainable nations: what do aggregate indexes tell us? *Environment, Development and Sustainability*, **12**(1), 49–62.

Porter, Michael E, & Van der Linde, Claas. 1995. Toward a new conception of the environment-competitiveness relationship. *The journal of economic perspectives*, 97–118.

Rauscher, Michael. 2005. International trade, foreign investment, and the environment. *Handbook of environmental economics*, **3**, 1403–1456.

Reid, E.M., & Toffel, M.W. 2009. Responding to Public and Private Politics: Corporate Disclosure of Climate Change Strategies. *Strategic Management Journal*, **30**, 1157–1178.

Rezza, Alief A. 2015. A meta-analysis of FDI and environmental regulations. *Environment and Development Economics*, **20**(02), 185–208.

Siegel, D.S., & Vitalino, D.F. 2007. An empirical analysis of the strategic use of Corporate Social Responsibility. *Journal of Economics and Management Strategy*, **16(3)**, 773–792.

Wackernagel, M., & Rees, W. 1996. *Our ecological footprint: Reducing human impat on the earth*. Gabriola Island, Canada: New Society Publishers.

6 Appendix: Additional Tables and Figures

Table 6: Cross-Correlation Table

Variables	Treaties	EPI	GDP	GDP p.c.
Treaties	1			
EPI	-0.09	1		
GDP	-0.1001	0.56	1	
GDP p.c.	-0.0713	0.1712	0.3576	1

Note: Treaties is the standardized value of the number of "Participation in treaties", "Environmental strategies or action plans" and "Biodiversity assessments, strategies or action plans". It is provided by the World Bank (WB) for 2009. EPI is the Environmental Performance Index measured by the Yale Center for Environmental Law and Policy and the CIESIN, Columbia University for 2008.

Table 7: Environmental Country Indexes (Selected Countries)

Variables	Treaties	EPI
Argentina	10	81.8
Brazil	10	82.7
Canada	11	86.6
China	11	65.1
Costa Rica	11	90.5
France	10	87.8
Ghana	11	70.8
Germany	9	86.3
Japan	9	84.5
South Africa	10	69
South Korea	9	79.4
United Kingdom	11	86.3
United States	7	81
United Arab Emirates	8	64

Note: Treaties is the standardized value of the number of "Participation in treaties", "Environmental strategies or action plans" and "Biodiversity assessments, strategies or action plans". It is provided by the World Bank (WB) for 2009. EPI is the Environmental Performance Index measured by the Yale Center for Environmental Law and Policy and the CIESIN, Columbia University for 2008.

Table 8: Distribution of the Vigeo Sample

NACE 2-digit industry	% **of firms**		% **of total assets**	
	Vigeo	**Orbis**	**Vigeo**	**Orbis**
Financial and Insurance Activities	20.33	6.06	80.81	70.34
Manufacturing	37.21	11.97	7.89	8.20
Electricity, Gas, Steam and Air Conditioning	4.72	0.58	3.25	2.18
Mining and Quarrying	3.27	0.31	2.46	1.70
Information and Communication	9.98	4.58	2.43	1.92
Construction	4.54	12.93	0.81	1.53
Wholesale and Retail Trade	4.54	20.14	0.75	2.81
Transportation and Storage	2.90	3.25	0.43	1.45
Administrative and Support Service Activities	2.72	5.46	0.28	1.41
Professional, Scientific and Technical Activities	2.18	12.30	0.25	4.46
Real Estate Activities	2.36	7.53	0.19	1.71
Water Supply, Sewerage, Waste Management	0.91	0.48	0.17	0.27
Accommodation and Food Service Activities	1.81	3.74	0.14	0.33
Other Service Activities	0.18	3.07	0.06	0.63
Arts, Entertainment and Recreation	0.91	1.54	0.02	0.16
Public Administration and Defense	0.18	0.13	0.01	0.18
Agriculture, Forestry and Fishing	0.18	2.02	0.01	0.17
Others	0.00	3.93	0.00	0.56

Note: The data in the $Vigeo$ sample are calculated on the sample of the 551 firms for which we have firm-level characteristics from $Orbis$. The data from the $Vigeo$ and the whole $Orbis$ samples are for the year 2010.

Table 9: Number of Firms of the Vigeo Sample

	# of firms, by country			
	Mean	Std Dev.	Min	Max
Europe	176.18	123.20	13	461
America	86.23	102.13	2	405
Asia & Pacific	85.14	85.73	1	253
Middle East	31.23	36.07	2	117
Africa	26.51	35.42	1	188

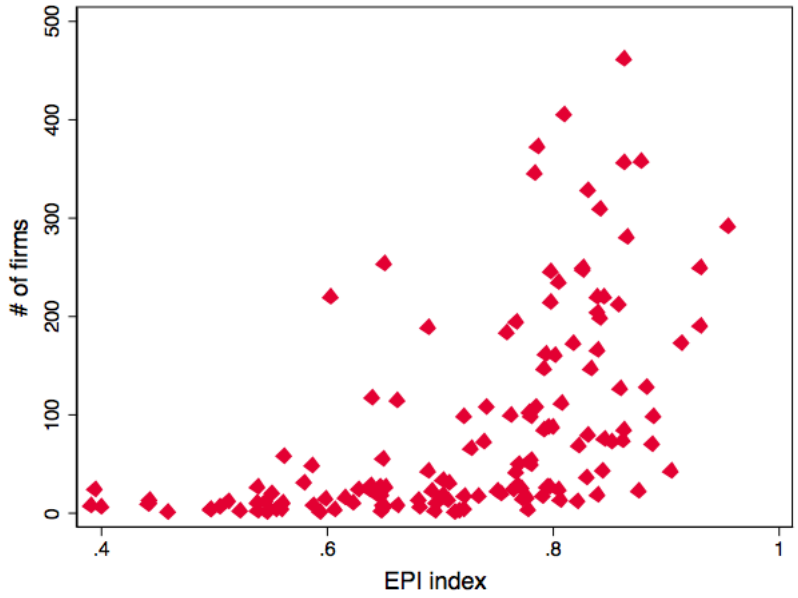
Note: Statistics are calculated from $Orbis$, on the 551 firms for which we have firm-level characteristics, for the year 2010.

Table 10: Top 10 destination countries

	# of firms	Epi Index
GBR	461	0.86
USA	405	0.81
NLD	372	0.79
FRA	357	0.88
DEU	356	0.86
BEL	345	0.78
ESP	328	0.83
ITA	309	0.84
CHE	291	0.96
CAN	280	0.87

Note: Statistics are calculated from $Orbis$, on the 551 firms for which we have firm-level characteristics, for the year 2010.

Figure 2: Environmental Standards and # of Firms, by Destination



Note: This Figure plots the EPI index in 2008 and the number of firms that have affiliates located in each country in 2010. This number of firms is measured thanks to the Orbis database.

Table 11: Location Decision and Productivity

Dependent Variable	Location					
Specifications	(1)	(2)	(3)	(4)	(5)	(6)
CER	0.0404*	0.0256	0.0405*	0.0240*	0.0144	0.0242*
	(0.0211)	(0.0216)	(0.0213)	(0.0135)	(0.0146)	(0.0136)
CER x EPI	-0.264*		-0.264*	-0.190**		-0.190**
	(0.145)		(0.145)	(0.0850)		(0.0850)
CER x # of Treaties		0.00172	-0.000554		0.000110	-0.00112
		(0.0146)	(0.0140)		(0.00929)	(0.00827)
Productivity	0.0134***	0.0108***	0.0133***			
	(0.00352)	(0.00381)	(0.00353)			
Productivity x EPI	-0.106***		-0.106***			
	(0.0164)		(0.0164)			
Productivity x # of Treaties		0.00140	0.000509			
		(0.00200)	(0.00174)			
# of Countries				0.0880***	0.0959***	0.0880***
				(0.00560)	(0.00499)	(0.00561)
# of Countries x EPI				-0.0558**		-0.0566**
				(0.0242)		(0.0242)
# of Countries x # of Treaties					-0.000367	-0.000775
					(0.00263)	(0.00235)
Firm-level Controls	Yes	Yes	Yes	Yes	Yes	Yes
Bilateral Controls	Yes	Yes	Yes	Yes	Yes	Yes
Country of Origin FE	Yes	Yes	Yes	Yes	Yes	Yes
Country of Destination FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	11,408	11,408	11,408	11,408	11,408	11,408
Pseudo R2	0.404	0.399	0.404	0.497	0.496	0.497

Note: Robust standard errors clustered at the origin-destination country pair level in parentheses,*** significant at the 1%, ** at the 5%, and * at the 10% level. Probit estimations with marginal effects computed at means. $Productivity$ is estimated by the authors, as explained in section 4.2. $\#\ of\ Countries$ counts the number of destination countries in which a firm is located. CER is the firm-level $Vigeo$ score of $Corporate\ Environmental\ Responsibility$. EPI is the destination country-specific $Environmental\ Performance\ Index$ provided by the Yale Center for Environmental Law and Policy (YCELP) and the Center for International Earth Science Information Network (CIESIN), Columbia University. $\#\ of\ Treaties$ is the destination country-specific standardized values of the count of "Participation in treaties" and "Environmental strategies or action plans" and "Biodiversity assessments, strategies or action plans", provided by the World Bank.

Table 12: Location Decision and the Globalization of Firms, subsamples

Dependent Variable	Location					
Sample	# of Countries served by Foreign Aff.					
	$\leq$ Average	> Average	1st quartile	2nd quartile	3rd quartile	4st quartile
Specifications	(1)	(2)	(3)	(4)	(5)	(6)
CER x EPI	-1.080***	-0.177	-2.708***	1.203	-0.539	-0.457
	(0.281)	(0.355)	(0.626)	(1.308)	(0.623)	(0.715)
Bilateral Controls	Yes	Yes	Yes	Yes	Yes	Yes
Country of Destination FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,905	4,551	1,320	1,140	1,785	2,223
Pseudo R2	0.385	0.447	0.326	0.365	0.368	0.406

Note: Robust standard errors clustered at the origin-destination country pair level in parentheses,*** significant at the 1%, ** at the 5%, and * at the 10% level. Probit estimations with marginal effects computed at means. CER is the firm-level $Vigeo$ score of $Corporate\ Environmental\ Responsibility$. EPI is the destination country-specific $Environmental\ Performance\ Index$ provided by the Yale Center for Environmental Law and Policy (YCELP) and the Center for International Earth Science Information Network (CIESIN), Columbia University.

Table 13: Cross-Correlation: Institutional Variables

	EPI	# Treaties	ICRG	Regul. Qual.	Rule of Law	Inv. Protect.	Corp. Taxe	Corruption
EPI	1							
# Treaties	0.03	1						
ICRG	0.5913*	0.09	1					
Regul. Qual.	0.64*	0.16	0.84*	1				
Rule of Law	0.63*	0.17*	0.93*	0.88*	1			
Inv. Protect.	0.3*	0.08	0.46*	0.54*	0.5*	1		
Corp. Tax	-0.22*	0.07	-0.14	-0.27*	-0.26*	-0.19*	1	
Corruption	0.6*	0.14	0.91*	0.85*	0.94*	0.48*	-0.22*	1

Note: * Significant correlation (0.05). Source: Kaufmann *et al.* (2010), Quality of Government Database. EPI (Yale Center for Environmental Law and Policy and the CIESIN, Columbia University). Treaty (World Development Indicators, World Bank)

Table 14: Location Decision Robustness Check: Quality of Institutions and EPI

Dependent Variable	Location					
Institutions Measure	ICRG	Regulatory Quality	Rule of Law	Investment Protection	Corporate Tax Rate	Corruption
Specifications	(1)	(2)	(3)	(4)	(5)	(6)
CER	0.0485***	0.0478***	0.0480***	0.0491***	0.0496***	0.0464***
	(0.0107)	(0.0106)	(0.0107)	(0.0107)	(0.0108)	(0.0107)
CER x EPI	-0.253***	-0.236***	-0.242***	-0.268***	-0.273***	-0.218***
	(0.0793)	(0.0767)	(0.0784)	(0.0795)	(0.0798)	(0.0780)
EPI	0.319***	0.261***	0.307***	0.333***	0.317***	0.306***
	(0.0350)	(0.0361)	(0.0354)	(0.0355)	(0.0353)	(0.0346)
Institutions	0.0928***	0.0524***	0.0275***	0.00803***	0.000187	0.0150***
	(0.0223)	(0.00594)	(0.00482)	(0.00205)	(0.000172)	(0.00222)
GDP per Capita	-0.0177***	-0.0310***	-0.0226***	-0.0135***	-0.00910**	-0.0276***
	(0.00397)	(0.00418)	(0.00416)	(0.00391)	(0.00389)	(0.00430)
GDP per Capita	0.0631***	0.0648***	0.0645***	0.0627***	0.0634***	0.0657***
	(0.00214)	(0.00203)	(0.00212)	(0.00207)	(0.00232)	(0.00214)
Market Potential	0.00911	0.00950	0.00939	0.00848	0.00888	0.00934
	(0.00960)	(0.00951)	(0.00962)	(0.00955)	(0.00960)	(0.00966)
# of Days	-0.00667*	0.00165	-0.00325	-0.0105***	-0.0139***	-0.00190
	(0.00354)	(0.00337)	(0.00357)	(0.00352)	(0.00308)	(0.00349)
Distance	-0.0418***	-0.0399***	-0.0409***	-0.0461***	-0.0428***	-0.0435***
	(0.00395)	(0.00361)	(0.00391)	(0.00426)	(0.00407)	(0.00391)
Com. Language	0.0607***	0.0610***	0.0614***	0.0578***	0.0627***	0.0583***
	(0.0137)	(0.0128)	(0.0136)	(0.0138)	(0.0138)	(0.0132)
Assets	0.0134*	0.0132*	0.0133*	0.0134*	0.0135*	0.0133*
	(0.00752)	(0.00750)	(0.00755)	(0.00750)	(0.00752)	(0.00758)
Age	0.0180***	0.0180***	0.0181***	0.0179***	0.0179***	0.0182***
	(0.00260)	(0.00260)	(0.00261)	(0.00259)	(0.00259)	(0.00262)
Op. Revenue	0.0670***	0.0669***	0.0672***	0.0669***	0.0669***	0.0677***
	(0.00392)	(0.00387)	(0.00391)	(0.00393)	(0.00396)	(0.00391)
Liabilities	-0.0343***	-0.0342***	-0.0343***	-0.0343***	-0.0344***	-0.0345***
	(0.00647)	(0.00645)	(0.00648)	(0.00646)	(0.00647)	(0.00652)
Liquidity	0.0126***	0.0125***	0.0126***	0.0124***	0.0125***	0.0128***
	(0.00353)	(0.00354)	(0.00355)	(0.00352)	(0.00354)	(0.00356)
# of Employees	0.00518***	0.00518***	0.00520***	0.00515***	0.00517***	0.00524***
	(0.000566)	(0.000566)	(0.000568)	(0.000565)	(0.000569)	(0.000573)
Country of Origin FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	42,978	42,978	42,978	42,978	42,978	42,978
Pseudo R2	0.388	0.394	0.389	0.388	0.387	0.391

Note: Robust standard errors clustered at the origin-destination country pair level in parentheses,*** significant at the 1%, ** at the 5%, and * at the 10% level. Probit estimations with marginal effects computed at means. CER is the firm-level $Vigeo$ score of $Corporate\ Environmental\ Responsibility$. EPI is the destination country-specific $Environmental\ Performance\ Index$ provided by the Yale Center for Environmental Law and Policy (YCELP) and the Center for International Earth Science Information Network (CIESIN), Columbia University.

Table 15: Alternative *De Facto* Standards: Ecological Footprint Index per GDP unit

Dependent Variable	Location		
Specifications	(1)	(2)	(3)
CER	0.0346***		0.0396***
	(0.00781)		(0.00889)
CER × Footprint	0.119***	0.0516*	0.158***
	(0.0401)	(0.0286)	(0.0470)
Footprint			0.0553**
			(0.0243)
Distance	-0.0887***	-0.0524***	-0.0355***
	(0.00750)	(0.00485)	(0.00345)
Com. Language	0.0451***	0.0318***	0.0526***
	(0.00779)	(0.00540)	(0.0116)
Assets	0.0128**		0.0133**
	(0.00576)		(0.00634)
Age	0.0136***		0.0150***
	(0.00202)		(0.00220)
Op. Revenue	0.0514***		0.0561***
	(0.00273)		(0.00329)
Liabilities	-0.0285***		-0.0306***
	(0.00494)		(0.00546)
Liquidity	0.00939***		0.0106***
	(0.00265)		(0.00297)
# of Employees	0.00421***		0.00460***
	(0.000453)		(0.000488)
GDP per capita			0.0143***
			(0.00306)
GDP			0.0534***
			(0.00201)
Market Potential			0.00890
			(0.00815)
# of Days			-0.00903***
			(0.00271)
Country of Origin FE	Yes	No	Yes
Country of Destination FE	Yes	Yes	No
Firm FE	No	Yes	No
Industry FE	Yes	No	Yes
Observations	49,010	49,010	49,010
Pseudo R2	0.439	0.566	0.391

Note: Robust standard errors clustered at the origin-destination country pair level in parentheses,*** significant at the 1%, ** at the 5%, and * at the 10% level. Probit estimations with marginal effects computed at means. $Footprint$ is the Global Ecological Footprint per GDP unit and is provided by the Global Footprint Network. The value is standardized between 0 and 1.

Table 16: Location Decision: Sectorial Analysis

Dependent Variable	Location		
Sample:	Without Mining & Quarrying	Without Financial & Insurance Activities	Without Services
Specifications	(1)	(2)	(3)
CER	0.0269***	0.0311***	0.0219**
	(0.00692)	(0.00714)	(0.00894)
CER × EPI	-0.131***	-0.178***	-0.125**
	(0.0483)	(0.0503)	(0.0584)
Distance	-0.0766***	-0.0814***	-0.0824***
	(0.00648)	(0.00683)	(0.00739)
Com. Language	0.0406***	0.0417***	0.0358***
	(0.00687)	(0.00719)	(0.00713)
Assets	0.00925*	0.00925*	0.00398
	(0.00514)	(0.00533)	(0.00654)
Age	0.0119***	0.0122***	0.0112***
	(0.00179)	(0.00182)	(0.00241)
Op. Revenue	0.0441***	0.0496***	0.0480***
	(0.00242)	(0.00259)	(0.00277)
Liabilities	-0.0230***	-0.0262***	-0.0162***
	(0.00432)	(0.00446)	(0.00572)
Liquidity	0.00729***	0.00749***	0.00150
	(0.00233)	(0.00247)	(0.00321)
# of Employees	0.00364***	0.00391***	0.00308***
	(0.000392)	(0.000415)	(0.000442)
Country of Origin FE	Yes	Yes	Yes
Country of Destination FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Observations	49,183	50,827	39,420
Pseudo R2	0.451	0.445	0.446

Note: Robust standard errors clustered at the origin-destination country pair level in parentheses,*** significant at the 1%, ** at the 5%, and * at the 10% level. Probit estimations with marginal effects computed at means. Specification 1 is based on the sample of firms that are not included in the "Mining and Quarrying" sector. Specification 2 excludes firms in the "Financial and Insurance Activities" sector. Specification 3 excludes firms in service sectors, i.e. "Accommodation and Food Service Activities", "Administrative and Support Service Activities", "Financial and Insurance Activities", "Information and Communication", "Professional, Scientific and Technical Activities", "Public Administration and Defense" and "Other Service Activities".

Table 17: Location Decision Robustness Check: Origin Country

Dependent Variable	Location			
	Coefficient	SE	# of obs.	Pseudo R2
Exclusion of:				
Austria	-0.172***	0.0489	50,827	0.447
Belgium - Luxembourg	-0.176***	0.0496	50,184	0.440
Bermuda	-0.168***	0.0485	51,649	0.445
Switzerland	-0.176***	0.0503	48,008	0.440
Germany	-0.222***	0.0475	45,560	0.444
Denmark	-0.140***	0.0495	50,827	0.443
Spain	-0.162***	0.0498	48,498	0.448
Finland	-0.157***	0.0493	49,320	0.447
France	-0.115*	0.0498	41,888	0.446
United Kingdom	-0.115*	0.0685	36,720	0.454
Greece	-0.178***	0.0489	51,101	0.444
Ireland	-0.175***	0.0503	50,553	0.443
Iceland	-0.168***	0.0485	51,649	0.445
Italy	-0.172***	0.0499	50,005	0.445
Netherlands	-0.188***	0.0504	48,824	0.444
Norway	-0.171***	0.0485	50,964	0.446
Portugal	-0.171***	0.0489	51,238	0.445

Note: Robust standard errors clustered at the origin-destination country pair level in parentheses,*** significant at the 1%, ** at the 5%, and * at the 10% level. Probit estimations including origin country, destination country, NACE industry fixed effects and firm-specific and bilateral control variables. Marginal effects computed at means.

Table 18: Location Decision Robustness Check: Region of Destination

Dependent Variable	Location			
	Coefficient	SE	# of obs.	Pseudo R2
Exclusion of:				
Africa	-0.224**	0.111	38,831	0.426
Central America	-0.186***	0.0530	47,125	0.444
Central Asia	-0.184***	0.0514	50,141	0.442
Europe	-0.0391	0.0263	38,728	0.432
Middle East	-0.206***	0.0547	46,748	0.444
North Africa	-0.161***	0.0476	50,141	0.451
North America	-0.154***	0.0463	50,518	0.437
Northeast Asia	-0.166***	0.0468	49,764	0.446
Pacific	-0.177***	0.0495	50,141	0.445
South America	-0.180***	0.0492	47,502	0.451
South Asia	-0.160***	0.0509	49,387	0.446

Note: Robust standard errors clustered at the origin-destination country pair level in parentheses,*** significant at the 1%, ** at the 5%, and * at the 10% level. Probit estimations including origin country, destination country, NACE industry fixed effects and firm-specific and bilateral control variables. Marginal effects computed at means.