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The greenwashing machine: Is CSR more than communication? *

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Abstract

Corporate Social Responsibility (CSR) and advertising are strategic complements. Short of assuming firms are pure benevolent, firms will consider CSR as beneficial if it contributes to their sales and/or profits. However, it could be that communicating on CSR represents by itself a good strategy. If the claim about the environmental or social benefits of the product is unsubstantiated or misleading, this practice is known under the name of greenwashing (GW). If consumers do not discover there is no CSR, they may be attracted by a so-called CSR product because of the advertising. This paper provides both a theoretical and an empirical frameworks to explore this question. The model clearly identifies some “usual suspects” that will prefer GW over CSR. We then conduct an empirical analysis using data on CSR, economic data of the 500 largest European firms to test the predictions. Several instruments are used in order to estimate the propensity to prefer GW, such as the number of pages of sustainable development reports. We show that “hard greenwashing”, i.e active communication with no CSR at all, is not a credible strategy and therefore propose the concept of “light greenwashing” that is empirically verified.

J.E.L.: M14, M37, L15, D83

Key-words: Corporate Social Responsibility, Greenwashing, Communication.

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1 Introduction

More and more firms launched some initiatives related to their social and environmental responsibilities. If the debate over the responsibility of the firm within society is far from being new, the fears created by the globalization and the huge challenge raised by climate change may explain a rising concern by the consumers and thus a new interest from the firms themselves. The Corporate Social Responsibility (CSR) is a notion that is not well defined and the verifiability of the real commitment of firms in CSR is weak. The picture is therefore quite clear. The consumers want more CSR and may be willing to pay for that. Firms are aware of that demand for CSR and may find it profitable to invest in CSR if the demand is high enough. However, CSR is costly, so firms may be tempted to communicate over a non-existent or overestimated effort in CSR.

Of course, the development of CSR raises different issues or problems. The first one is the famous critic raised by Friedman (1962) who considers that the only social responsibility of the firm is to make profits. This is the *instrumental* view of CSR, or strategic CSR (Baron, 2001): firms will engage in CSR only if they have an economic interest to do so (Mitchell, Agle, and Wood, 1997; Odgen and Watson, 1999). In other words, firms will be “responsible” if and only if it is a way to maximize their profits or their market share. May be because of this argument, another group (Jones, 1996; Gendron, Lapointe, and Turcotte, 2004)¹ criticizes CSR for the same reason. Nevertheless this group has come to opposite conclusions. CSR is seen as a way to substitute “soft laws” to “hard laws”. For this group of people, CSR is a way to weaken the welfare state and to put the maximization of the profit at the top of the collective priorities.

One of the key aspect of these critics is the skepticism towards the social and environmental commitments of the firms: “*The image of multinational companies working hard to make the world a better place is often just that - an image*”, said a report of the British NGO ChristianAid (2004) who called for “*new laws to make businesses responsible for protecting human rights and the environment wherever they work*”. This skepticism may be reinforced by the “greenwashing”

¹Lots of NGOs or trade unions also share this opinion (Tassi, Collomb, and Saincy, 2009).

behavior. This notion of greenwashing has been used in the eighties and is defined by Greenpeace as “the act of misleading consumers regarding the environmental² practices of a company or the environmental benefits of a product or service”. TerraChoice Environmental Marketing Inc. conducted a survey of six category-leading big box stores. Through these surveys, they identified 1,018 consumer products bearing 1,753 environmental claims. Of the 1,018 products examined, all but one made “*claims that are demonstrably false or that risk misleading intended audiences.*” For the skeptical, CSR cannot be seen as a new model of development or regulation because of the large scale of greenwashing. The responsibility of firms in ecological disasters and their inability to foresee and anticipate their consequences probably reinforce this skepticism.

The denunciation of greenwashing does not mean that firms do not have to communicate around social or environmental considerations. In most cases, CSR and communication will be seen as strategic complements under the instrumental view of CSR. Nevertheless, if both CSR and communication have a significant cost, the firm may decide to choose the relative proportion of CSR and communication according to a trade-off between the reality of the social and environmental commitments and the need for the firm to use these commitments in a broader communication strategy.

This paper investigates the extent to which firms use “green” communication and advertising as a substitute or complement to CSR. We model the communication between consumers and firms and determine under what conditions it is profitable for the firm to invest (relatively) more in communication or in CSR. The core structure of the framework relies on Dewatripont and Tirole (2005). This model involves two agents, a sender and a receiver. They exchange some hard and/or soft information (issue-relevant and cue messages, respectively), the former being verifiable information on the CSR investment whereas the latter only gives non verifiable information aimed at increasing the credibility of the sender. We identify some “usual suspects” that will have a higher probability to prefer the communication to investment in CSR, relatively. This preference corresponds to a strategy of “light greenwashing” that involves some CSR investment

²In this paper, we will enlarge the definition of greenwashing with the inclusion of social practices. The concept of socialwashing is sometimes evoked.

but less than otherwise without access to cue communication. We then test empirically some implications of the model, using an original database on CSR level for the biggest 595 European firms and on the level of *reporting* that will be used as a proxy of “green” communication. This trade-off will mainly depend on the consumers’ confidence, on the firms’ credibility and the intrinsic characteristics of the product.

The literature largely studied the determinants of CSR. Garriga and Melé (2004) distinguish four families of theories explaining the development of CSR: the instrumental theories, the political theories, the integrative theories and the ethic theories. But this framework does not allow a distinction between an effective level of CSR and a possible strategy of greenwashing. After having introduced the distinction between search good and experience good (Nelson, 1970), Nelson (1974) showed that advertising strategy depends on the nature of the good itself. The search goods is a category of product whose quality can be revealed before purchase. Concerning experience goods, the only way to have an estimate of their quality is to taste it. CSR would be more developed for this last category of goods. McWilliams and Siegel (2001) showed a positive correlation between experience goods and advertising. Siegel and Vitalino (2007) investigates empirically the determinants of CSR and confirm that CSR tends to be more important for experience goods.

Baron (2001) shows that CSR can be motivated by profit maximization, altruism or threat by an activist. The threat comes from a possible boycott if the firm rejects the claims of the activist. Baron and Diermeier (2007) study how activist’ campaigns may change practices of firms and Baron (2009b) highlight how the quality of activists may affect the type of firms targetted: firms practicing morally motivated CSR or firms practicing CSR induced by social pressure. Baron (2009a) shows empirically that social pressure tends to increase corporate social performance.³

Our analysis makes a number of contributions to the literature. To the best of our knowledge, it is one of the first economic analysis of greenwashing. One noticeable exception is the

³Baron (2010a) distinguishes between corporate social responsibility (CSR) and corporate social performance (CSP). CSP pertains to social activity that satisfy two conditions: (1) there are beyond the requirement of the law and (2) they involve the private provision of a public good. CSR implies CSP but also involves a “*moral duty to undertake social activities.*”

work of Lyon and Maxwell (2010) that presents a theoretical paper using a persuasion game in order to model the greenwashing strategy. In this paper, we first propose a theoretical framework explaining when communication and CSR are strategic complements and when they are substitutes in order to determine what is greenwashing. Our basic framework is quite close to the example of a more general self-regulation model presented in Baron (2010b). We focus on communication strategies whereas Baron (2010b) focuses on self-regulation motivations due to moral preferences. It is worth noticing that there are some common conclusions from both models despite mechanisms are totally different. Second, some of the theoretical implications are tested empirically. We propose an original estimation of the level of CSR *reporting* for the 595 biggest European firms and a new index of their effective level of CSR built from VIGEO data. We define different level of commitments, from the simple communication in CSR reports (the “cues” communication in Dewatripont and Tirole (2005)) to the external certification (the “issue-relevant” communication in Dewatripont and Tirole (2005)).

The paper is organized as follow. In section 2, we present the basic framework, based on Dewatripont and Tirole (2005). In section 3, we study when it is “strategic” for the firm to use greenwashing, using the framework presented in section 2. We see how cues and hard information may influence these strategies. From these two sections, we derive some empirical predictions. In section 4, we present the three sets of data we use in the paper: (1) the effective level of CSR, approximated by an original index built from VIGEO data, (2) the level of CSR communication, approximated by various indexes of *reporting*, (3) the external certification asked by the firms in the frame of the *Global Reporting Initiative*. In section 5, we show empirically when CSR and communication are substitutes or complements. Finally, we conclude in section 6.

2 Basic framework

Dewatripont and Tirole (2005) (D & T 05 hereafter) provide a simple framework for the study of modes of communication. They introduce two types of relations between a sender, S, and a receiver, R. Either their relation is governed by a Supervisory Decision Making (SDM) or by an

Executive Decision Making (EDM). Under the former, the information the communication may convey helps the receiver to decide whether she chooses action A or the status quo. Under the latter, without any communication, the receiver would never choose to take action A.

2.1 Representative consumer and firm

The action A we consider in this paper is buying a more expansive product or not. We assume the payoff of R under the status quo is 0. The consumer (receiver) would then choose action A if the product contains CSR. Therefore, there is an implicit utility function such that the consumer derives a higher indirect utility for consuming a good that contains CSR, despite the price is higher.⁴ We shall consider in another section the case of a continuous content of CSR. In such case, there is a tradeoff between the price charged and the expected level of CSR in the product.

The theoretical approach in this paper is thus quite different from Lyon and Maxwell (2010). In their paper, a greenwasher is a firm that selectively discloses good news while she retains bad news. While in this paper, the fact the information is verifiable or not is the key aspect. As a consequence, a greenwasher in this paper is a priori a firm that has sent some soft information in order to reduce the level of hard information that she sends. Moreover, in Lyon and Maxwell (2010), an activist punishes a firm that greenwashes and therefore they study the optimal reaction of a firm facing such an activist's behavior. Our paper is more about studying a reputation effect and the relationship between the firm and a consumer doubtful about the CSR incorporated in the product.

Several types of consumer may exist that differ according to their degree of risk aversion. For instance, a suspicious one considers that without any information, there is no CSR in a product. Consequently, its decision is similar to the EDM. Whereas a risk neutral consumer assumes there is a probability the product contains CSR. Hence, her action corresponds to SDM.

⁴This hypothesis is common in the analysis of CSR. It is confirmed by surveys conducted by the Marymount University: consumers claimed to be willing to pay as much as one dollar or 5 percent more for apparel not manufactured in sweatshops (Dickson, 2001). Pelsmacker, Driesen, and Rayp (2001) showed that the average price premium that the Belgian consumers were willing to pay for a fair-trade label was 10%. Another study revealed that, on average, 46% of European consumers also claimed to be willing to pay substantially more for ethical products (MORI, 2000).

This distinction is close to the one of Gabaix and Laibson (2006) that also introduces two types of consumers, the sophisticated and the unsophisticated ones. The first of them being aware of the existence of high add-ons price, contrary to the second, that are myopic with respect to that aspect.

Therefore, the suspicious consumer attributes a nil ex-ante probability that taking action A will generate a positive revenue (or an indirect utility increase). A risk neutral consumer establishes an ex-ante probability that is non nil. Similarly to D & T 05, this ex-ante probability is such that the lowest probability from which the consumer expects a positive revenue from taking action A is

$$\alpha^* = \frac{-r_L}{r_H - r_L} \quad (1)$$

where r_L (r_H) is the low (high) revenue. The revenue here is to be considered as the difference between the relative prices of both products and the indirect utility the consumer derives from the extent of CSR contained in the product. Therefore, buying a product that contains no CSR at all yields an unambiguously negative revenue as the product that may contain CSR is more expansive than the standard product. With p_H (p_L) the price charged for a (non) CSR product, $r_L = E[U(CSR = 0)] - p_H < 0$, $r_H = E[U(CSR > 0)] - p_H > 0$. If the consumer does not choose A, it gets $E[U(CSR = 0)] - p_L = 0$. $E[U(\cdot)]$ means that the consumer is not able to verify if the product indeed contains CSR. He however knows that if it does, this would yield him a higher utility. We consider that firms know how consumers value the CSR content.

A product could also have the property giving some information about its CSR content. A product may fully or partly reveal its real CSR content to the consumer. If a product has not this property, this is similar to the case of the suspicious consumer: since it is impossible to verify the product content, a consumer will never choose to buy it. Similarly, a product that reveals a part of its CSR content amounts to the case of a risk neutral consumer. It would influence, possibly, the ex-ante probability α^* . This reminds the distinction between “search goods” and “experience goods” proposed by Nelson (1970). However, the much closer type of

good is probably the “credence good” introduced by Darby and Karni (1973). These goods are commonly known as goods for which the consumer can hardly guess the utility it derives from it even after it has consumed it. In Dulleck, Kerschbamer, and Sutter (2010), they propose a slightly different definition. The consumer is able to measure the utility of the good after it has consumed it but it is not able to guess the quality or the type of the good. This implies that the utility the consumer derives from the good does not depend on the quality.⁵ In this paper, the utility is assumed to depend on the CSR content of the product. The particularity of a good of revealing part of its CSR content or the degree of gullibility of consumer have here the same theoretical consequences despite we acknowledge they are not similar problems.

We use a very general utility function. The consumer could have a preference for goods containing CSR either because CSR represents a kind of a “quality” dimension or because the consumer has some moral preferences. These preferences could be altruistic or warm glow (Andreoni, 1990). If this is about quality, then we should refer to the first definition of credence good evoked just above. If this is about moral preferences, then the second definition should be retained as CSR is not a part of the good itself but rather a complement. Consequently the utility consumers derive for consuming the good is known. This is how this consumption contributes to its moral preferences that is unknown.

2.2 Communication

We focus on a particular case developed in D & T 05 that involves cue communication. These “cues” convey no hard information on the CSR content but may convey information on the type of the sender, the firms. A “better news” is expected to raise the *congruence* between the consumer and the firm. This congruence has to be understood here as an *a priori* convergence of interest. The “*a priori*” is important as this allows us to make the parallel between cues and advertising. Of course, suspicious consumers that need some hard information on the CSR content would not be influenced by this ads. This corresponds then to the EDM case, for which only hard

⁵A good example they give is the taxi ride in an unknown city. The consumer’s utility depends on reaching point B from point A, no matter the way the taxi driver has chosen.

information communication may trigger the action A. Otherwise, a consumer that is more or less gullible corresponds to various SDM situations.

In order to modify the ex-ante decision that depends on the ex-ante probability, both actors, the sender and the receiver, may also make an effort in order to communicate and assimilate hard information. These efforts, labeled x and y for the sender and the receiver, respectively, are costly. Their costs $S(x)$ and $R(y)$ are increasing and differentiable. As in D & T 05, we assume the communication efforts of the consumer and the firm are strategic complements.⁶

For instance, the effort of the firm to communicate hard information is therefore comparable to a verifiable certification of the CSR content of the firm, by an independent agency for instance.⁷ For the consumer, it may be spending some time searching and verifying information.

We next focus on a case that is not developed in D & T 05: when cues coexist with the fact that the sender knows the receiver payoffs. We first present the two basic cases, which either involves only cues or only hard information communication. Next, we turn to the model that involves both.

3 Cues and hard information: when is it strategic to practice greenwashing?

3.1 Firms know the consumer payoff: hard information communication

This set-up is developed in D & T 05 so we just recall the main results. It is obvious that the firm has no incentive to send any information if she knows $r = r_L$. So in that case, a firm that has not invested in CSR will not communicate. The equilibrium with no communication is not of interest in this paper. The ex-ante probability of the consumer determines whether he buys or not the product. An optimistic one will buy it for instance. As one will see, it may be the

⁶Strategic complements are decisions of two or more players which mutually reinforce each other (Bulow, Geanakoplos, and Klemperer, 1985).

⁷See section 4 for discussion.

case that no communication occurs when $r = r_H$, precisely when the congruence (α) is high. So this is not an absurd decision of the consumer.

Consider now that $r = r_H$. For a low congruence, $\alpha < \alpha^*$, the consumer does not choose A without any communication. Hence, the equilibrium values of communication effort are given by:

$$R'(y^*) = x^* \alpha r_H \quad (2)$$

$$S'(x^*) = y^* s \quad (3)$$

In the case of high congruence, $\alpha > \alpha^*$, (2) holds under EDM. Under SDM, an equilibrium exists where no information is conveyed. However, another equilibrium does exist. The consumer may be worried because of the absence of information. As already mentioned, since there is no communication when the congruence is low, the absence of communication may then correspond either to a CSR product or not. In such case, the sender is obliged to make an effort. If we denote x^* and y^* the equilibrium communication effort, the two following conditions have to hold:

$$\frac{\alpha(1 - x^*y^*)}{1 - \alpha x^*y^*} r_H + \frac{1 - \alpha}{1 - \alpha x^*y^*} r_L < 0 \quad (4)$$

$$\alpha x^*y^* r_H - R(y^*) \geq r_H \alpha + (1 - \alpha) r_L \quad (5)$$

Since $R(y^*) > 0$, then the second inequality implies the first one. This second inequality yields a threshold α^{***} under which the sender needs to convey some hard information in order to induce the consumer to choose action A.⁸

The most important implication of that model is that two situations involving no communication are diametrically opposed as r could either be equal to r_H or to r_L . Now let introduce that a firm which has invested in CSR would only obtain a payoff of s_H , strictly lower than s_L , the payoff of a firm that has not invested in CSR, if they both succeed in selling the product at the high price. Is it interesting for a firm to invest in CSR? The answer is yes, under some

⁸If, of course, $\alpha^{***} > \alpha^*$.

conditions. If α is higher than the threshold defined by the equations above, then there is “real authority”. Hence, no hard information is sent. Everything depends on the ex-ante probability. Investing in CSR is therefore not optimal. However, if α is lower, then when choosing r_L , the firm has no chance to sell its product. Investing in CSR is therefore optimal if $s_H > S(x^*)$, where x^* is defined according to (2).

Result 1 *When only hard information can be sent. It is optimal to practice CSR iff*

$$\alpha < \alpha^{***}$$

$$s_H > S(x^*)$$

3.2 Firms know the payoffs: cues

To begin with cues, we again take the D & T 05’s framework. We assume communicating cues is not costly (or negligible compared to the communication of hard information). We will relax this assumption. The effort the firm makes in communicating cue allows to signal an *a priori* congruence that is either low, $\underline{\alpha}$, or high, $\bar{\alpha}$.

As the cue conveys no information on the CSR content of the product. The fact the firm knows that r is low or high does not affect the incentive of signaling a high α . Again, let us use the fact that the payoff of the firm is s_H or s_L whether she has invested in CSR or not, respectively, with $s_H < s_L$. Hence, a firm has never the incentive to invest in CSR in that case since she will bear the same (possibly negligible) cost of signaling for an absolutely identical outcome—A is chosen—but that would only yield a payoff of s_H if she had invested in CSR.

Result 2 *When only cues can be sent, it is never optimal to invest in CSR.*

So either it is optimal to choose to invest in CSR with hard information communication under some conditions; or the communication is a cue, hence not investing in CSR strictly dominates investing in CSR.

3.3 Hard information and cues

We now combine both types of communication in order to allow the following possible equilibria altogether:

- (i) Investing in CSR is optimal
- (ii) Not investing in CSR is optimal, with no communication
- (iii) Not investing in CSR is optimal, with communication
- (iv) It is never optimal to invest in CSR without communication.

The most important aspect when both communication types are mixed is that if equation (4) is not verified⁹, the optimal solution is to choose $r = r_L$ and to send a cue such that $\alpha > \alpha^{***}$, if and only if the cost of communicating a cue is not too high. We will refine this below. For now, we focus on the most simple case. The firm can either signal $\underline{\alpha}$, or $\bar{\alpha}$, with $\alpha = \gamma\bar{\alpha} + (1 - \gamma)\underline{\alpha}$, where γ is the associated probability of $\bar{\alpha}$. Hence, this means consumers form expectations over the probability the firm will be good or not.

Under EDM, there is no equilibrium *No-CSR/Cue* since cues convey no hard information on the CSR content of the product. As a consequence, greenwashing is impossible when consumers are suspicious. So we will mainly focus on the SDM case. It is worth to note that EDM corresponds to an *a priori* congruence equal to zero.

Several different possibilities need to be addressed. Suppose first that firms are not able to signal more than $\underline{\alpha} < \alpha^*$. This could be interpreted as a world of rather suspicious consumers.

If the firm knows that $r = r_L$, she has no incentive to communicate hard information, so she does not send a cue. If she knows $r = r_H$, therefore she sends a cue and the equilibrium communication efforts $(\underline{x}^c, \underline{y}^c)$ are given by

$$R'(\underline{y}^c) = \underline{x}^c \alpha r_H \tag{6}$$

$$S'(\underline{x}^c) = \underline{y}^c s \tag{7}$$

⁹If the inequalities are reversed then, as before (5) implied (4), now (4) implies (5).

Here, the optimal communication efforts are both lower for the consumer and the firm, compared to a situation without cue, for $\underline{\alpha} < \alpha^*$ which is assumed here.¹⁰

Now, firms can send $\bar{\alpha} > \underline{\alpha}$. First, assume firms can signal $\bar{\alpha} > \alpha^{***}$. In that case, whether firms know $r = r_L$ or $r = r_H$, they send the cue and the consumer rubber-stamps the action without any additional communication of hard information. So if the consumers are very gullible, the optimal action for the firm is to send cue without investing in CSR. This is a “real authority” situation.

If $\bar{\alpha} \in [\alpha^*, \alpha^{***}]$ and the firm knows $r = r_L$, she knows she will not send any hard information, but she is obliged to, since the consumer doubts about the CSR content of the product if no cue is sent such that the firm should send some hard information. So the firm will not either send a cue nor any hard information.

Obviously, if $r = r_H$, then both types of information are sent. The hard information communication efforts are given by (2) and (3), where $\bar{\alpha}$ replaces α , under EDM and SDM, under the condition, for SDM, that equation (5) holds.¹¹

If $r = r_H$, then hard information is communicated according to the efforts (2) and (3). To the contrary, when $r = r_L$, no communication takes place.

All in all, when $r = r_L$, the consumer would consider buying the product if and only if the congruence that can be revealed is high enough. When $r = r_H$, the consumer will always consider buying the product.

Proposition 1 (Hard greenwashing) *When cues and hard information communication coexist, if $\bar{\alpha} > \alpha^{***}$, then the optimal solution is No-CSR/Cue, that is hard (or full) green washing.*

*If $\bar{\alpha} < \alpha^{***}$, practicing CSR is the only way to sell the product (at a higher price). The optimal choice depends on the gains the firm obtains relatively to the cost of communicating hard information.*

A cue is always sent by a CSR firm if the ex ante probability, with no communication at all, is nil.

¹⁰Both types of communication are therefore substitutes.

¹¹Both types of communication are then complements.

So as one will see, this depends on the determinants of $\bar{\alpha}$. If this level is independent on the choice of the firm and depends on the gullibility of consumers or on the cost of advertising, then hard greenwashing is more likely to occur in a world of gullible consumers and/or very cheap advertising. If, as it will be studied in a next subsection, it is an endogenous choice of the firm, then the positive probability of hard greenwashing may be dissolved when consumers revise their preferences.

3.4 Costly cues

Several additional hypotheses are necessary in order to represent more correctly the situation of the tradeoff between practicing CSR or not and (not) sending soft or hard information about its content. Assume now that the firm's cost of the cue communication is a function of α , and further assume that this function has the same property than the cost function of hard communication efforts, except for convexity. To sum up, the utility functions are as follows. For the consumer, if there is cue communication, the utility function is

$$U = U_C = xy\alpha r_H - R(y) - R_c \quad (8)$$

and for the firm

$$U = U_F = xy\alpha s_H - S(x) - S_c(\alpha) \text{ if CSR is practiced} \quad (9)$$

$$U = U_F = xy\alpha s_L - S(x) - S_c(\alpha) \text{ otherwise} \quad (10)$$

Whereas, if no cue is sent, the terms indexed with c have to be removed.

The cost of the cue is equal to $S_c(\alpha)$ for firms and is constant and negligible for the consumer. Since we interpret cue communication as ads, it seems rather intuitive to set the cost of assimilating the cue at a very low level for consumers. Consumers are not tracking for advertising, the probability they see one depends on the effort of firms.

3.4.1 Consumers

The consumer chooses action A under the following conditions. First, if $\alpha > \alpha^{***}$, the consumer chooses A if and only if $r_H - r_L > R_c$ since there is no hard information communication. If $\alpha < \alpha^{***}$, then she chooses A if and only if $r_H - r_L > R_c + R(y)$.

Recall that action A corresponds to paying the price p_H in order to obtain a product that may contain some CSR. If action A is not taken, then the price is p_L and we have that $E[U(CSR = 0)] - p_L = 0$. Otherwise, we have that $E[U(CSR = 0)] - p_H < 0$ if the product does not contain any CSR and $E[U(CSR)] - p_H > 0$ if it does. It is then possible to write that $r_H - r_L = E[U(CSR > 0)] - E[U(CSR = 0)]$. Moreover, if the hard information is assimilated, the consumer then chooses A (otherwise, neither the consumer nor the firm would have the incentive to make a communication effort). The consumer builds an anticipation such that the probability the product contains some CSR is α .

3.4.2 Firm

The firm is facing a tradeoff. Either she has not invested in CSR and the lowest cue level she would send is α^{***} .¹² Under CSR, the lowest level of cue is lower and then the cue is cheaper, but the firm only earns s_H . Conversely, under No-CSR, the lowest level is higher so sending a cue is more expensive but the reward is higher. As a consequence, the level of α is very important.

As for the notation, recall that $\bar{\alpha}$ (and all the upper bar α s) indicates the value the firm has set, α indicates the ex-ante value. Of course, the firm will have an incentive to send the cue if and only if the cue signals a probability higher than α .

Result 3 *If $r = r_L$, then $\bar{\alpha} = \alpha^{***}$, if feasible.*

Otherwise, no cue is sent.

This result is trivial as once the level α^{***} is reached, the consumer rubber-stamps action A. Setting a higher $\bar{\alpha}$ would then be a pure waste of resources. From a more pragmatcal point of

¹²Here, we still consider that the decision of investing in CSR has already been taken.

view, this would mean that a very good communication plan should be enough to convince a consumer that a firm is practicing CSR.

Consider now that $r = r_H$. In a cost analysis, the firm will prefer $\bar{\alpha} = \alpha^{***}$ to $\bar{\alpha} = \alpha^*$ if and only if $S[x(\alpha^*)] > S_c(\alpha^{***}) - S_c(\alpha^*)$, that is if the cost of sending a better cue is lower than the cost of sending hard information as a complement of the cue. This is true if $\alpha^{***} > \alpha^*$. However, as one will see, now that the cue has a cost, only firms having $r = r_L$ will have an incentive to send a very high cue (as is α^{***}) in most cases. Such a situation would then be problematic for r_L firms since they would be the only ones to send such a high cue.

Similarly, the firm prefers an intermediate level $\alpha^{**} \in [\alpha^*, \alpha^{***}]$ if and only if $S[x(\alpha^{**})] - S[x(\alpha^*)] > S_c(\alpha^*) - S_c(\alpha^{**})$.

Lemma 1 *If $r = r_H$, then $\bar{\alpha} = \alpha^{***}$ iff*

$$S[x(\alpha^*)] > S_c(\alpha^{***}) - S_c(\alpha^*) \quad (11)$$

*and $\bar{\alpha} = \alpha^{**} > \alpha^*$ iff*

$$S[x(\alpha^{**})] - S[x(\alpha^*)] > S_c(\alpha^*) - S_c(\alpha^{**}) \quad (12)$$

and $\bar{\alpha} = \alpha^$ otherwise.*

The most important effect comes from the elasticities of $S(\cdot)$ and $S_c(\cdot)$ with respect to α . Importantly, from the effort functions, we know that x depends on α in the following ways: The higher r_H and s_H , the higher the effect of α on x^* . Moreover, a weak $R'(y^*)$ and a high y^* have the same effect. That is, if the rewards are both large and if the consumer can set a high effort for a quite low cost, then the higher α , the higher x^* .

Hence, if cues are cheap, both types of communication are substitutes and sending high cues is preferred to sending hard information. This is true for the moment because sending α^{***} is feasible. Otherwise, there is a complementarity as both types of information are sent. Two effects are at work. As one or both rewards increase, this tends to increase the positive effect

of α over x^* , so the complementarity is stronger. But increasing the spending on α increases x^* and the corresponding spending. Consequently, the complementarity is stronger when both cost functions have the same properties, such that α^{**} would be preferred to α^* . Under these conditions, α^{**} is preferred and dominates as it corresponds to a higher α and a higher x^* so the probability is increased as well as the utility. When x and α are rather substitutes, the situation is less clear and we need to compare utility levels.

3.4.3 What situation dominates?

If $\bar{\alpha} = \alpha^*$, for a given s , the utility is $U_F^* = x^*y^*\alpha^*s - S[x(\alpha^*)] - S_c(\alpha^*)$. The equation is similar for $\bar{\alpha} = \alpha^{**}$. When $\bar{\alpha} = \alpha^{***}$, then the utility is equal to $U_F^{***} = s - S_c(\alpha^{***})$.

We assume that the utility of a firm that has not practiced CSR is such that $U_{F,L}^{***} = s_L - S_c(\alpha^{***}) > 0$. Hence, the GW is profitable. Since $s_L > s_H$, *No-CSR/Cue* dominates *CSR/Cue* if $\alpha^{***} = \alpha$ is affordable.

The α^{**} -*CSR/Cue* dominates *No-CSR/Cue* if and only if

$$S_c(\alpha^{***}) - S_c(\alpha^{**}) > s_L - x^*y^*s_H + S[x(\alpha^{**})] \quad (13)$$

First, we can study the necessary condition (since $s_L > s_H$):

$$S_c(\alpha^{***}) - S_c(\alpha^{**}) > s_H - x^*y^*\alpha^{**}s_H + S[x(\alpha^{**})] \quad (14)$$

The necessary condition corresponds to the choice of a firm that has decided to practice CSR and that has to decide whether to set $\bar{\alpha}$ equal to α^{**} or α^{***} . It precisely means that the firm has to prefer α^{**} . If this is not the case, hence the unique equilibrium would be *No-CSR/Cue* since a firm that practices CSR prefers to set $\bar{\alpha}$ to α^{***} which is dominated by not practicing CSR and sending the same cue.

Result 4 *If*

$$S_c(\alpha^{***}) - S_c(\alpha^{**}) < s_H(1 - x^*y^*\alpha^{**}) + S[x(\alpha^{**})] \quad (15)$$

the unique equilibrium is greenwashing if a firm is aware of this condition when choosing whether she invests in CSR or not.

This means that if $S_c(\alpha^{***})$ is sufficiently low, such that a firm that has set $r_H^* > 0$ would choose to send a cue α^{***} , then the equilibrium situation is announcing a high r_H^* , sending a cue $\bar{\alpha} = \alpha^{***}$ and practicing no CSR. More interestingly, if the firm has already taken its decision of investing in CSR, then both types of firms may be merged (i.e a CSR firm and a no-CSR firm may have set the cue to α^{***}). But this seems not very probable.

In the case of substitutability, if the cost of the cue is relatively higher than the cost of sending hard information, an increase in s_H that would yield an increase in α and therefore a decrease in x^* would simultaneously decrease the gap between $S_c(\alpha^{***})$ and $S_c(\alpha^{**})$, and would decrease $S[x^*(\alpha^{**})]$. The shape of cost functions has a very important impact. If the cost function of cue is steeper than the one of the hard information, an increase in s_H could increase the incentive of practicing greenwashing.

This result is important as it highlights that an increase in the reward of practicing CSR does not necessarily coincide with a reduction of GW. The reason is that an increase of s_H simply raises the reward the firm is certain to obtain if no hard information is sent. Consequently, a firm that is more productive in CSR is not necessarily inclined in communicating hard information and hence in practicing CSR. Therefore, if one extrapolates, a firm that is used to invest in R & D in order to improve CSR may reach a level which for she will not practice CSR anymore. Moreover, the reputation she may enjoy because of her history as an investor in R & D should help her doing this.

Proposition 2 *According to the relative elasticities of x , y with respect to s_H , of the elasticities of the cost functions to an increase of x and α , an increase in s_H **may or may not** increases the incentive to practice CSR.*

3.5 Continuous choice of the level of CSR

In order to have more practicable empirical predictions, we extend the model to a continuous choice of CSR level. The timing of events is as follows:

- i The firm chooses the CSR level
- ii The firm (S) decides the cue and the communication of hard information
- iii The consumer (R) receives the cue and the effort to assimilate the hard information
- iv Consumer decides to take action A or not.

We assume the firm has a technology such that in order to produce a good that contains a level r_H of CSR, she spends $s(r_H)$. Therefore, we have $s_H = s_L - s(r_H)$.

First, several remarks. One could think it is optimal to set a very low level of CSR r_H in order to be credible to the consumer's eyes. However, if firm communicates on a higher r_H , the level of $\bar{\alpha}$ that is needed to send in order to signal a high congruence is lower.

Therefore, the firm has an interest in increasing r_H since the cue that corresponds to the r_H announced is lower. That is, a firm that announces a low cue (compared to what is expected by the consumer) signals a higher content of CSR. However, this could ease the greenwashing strategy. Indeed, α^{***} also decreases. As we have shown, the "bad" firm has no incentives to announce a cue other than $\bar{\alpha} = \alpha^{***}$. Hence, a firm that has a high content in CSR can send a lower cue without being assimilated to a "bad" firm. As a consequence,

Testable Implication 1 *The higher the level of CSR the firm chooses, the lower the cue communication.*

With a higher r_H , it is possible to set a lower $\bar{\alpha}$ in order to enter a path with increasing communication efforts. The most important aspect is that the consumer that observes a lower $\bar{\alpha}$ will infer that there is a high CSR content. This result therefore underlines that improving CSR is not done only because of the consumer taste for CSR but also to facilitate the communication strategy of the firm.

3.5.1 Continuous CSR without cue

What does generate an incentive to increase CSR? We keep the timing of the previous subsection. Indeed, if decisions are simultaneous, this means that the consumer does not observe neither the r_H^* set by the firm, nor its communication effort. We need that either one, the other, or both are observable by the consumer.

(i) If r_H^* is announced ex ante by the firm, it is trivial that an increase in r_H increases the ex ante probability, hence the communication efforts. Since the probability and the cost of the CSR are monotonic in the CSR content, there is a unique equilibrium level of CSR.

(ii) If x is observed ex ante, the firm is in a position of a Stackelberg leader. Referring to this possibility in the D & T (05) framework, the effort is indeed increased, but not because of r_H since it is not observed by the consumer. In that case, the firm has no incentive to set a high r_H^* since its gain is decreasing in s_H .

(iii) Obviously, if both are observable by the consumer, efforts are increased uniquely because r_H has been observed ex ante. For that reason, we rule out the possibility evoked in D & T (05) were the effort of the sender is only partly observed since for the same reasons, the content in r_H is not the cause of the increase.

In order to compare both situations we focus on a slightly modified version of the first case (i): the firm has to commit to invest the level announced. In other words, when announcing a level r_H^* , the product, if it contains some CSR, has to contain the level r_H^* . So we assume that the announced r_H is indeed the one the consumer gets, if firm has practiced CSR. However, in such a case, a firm has an incentive to announce a r_H^* such that the ex ante probability exceeds α^{***} . If so, then no firm would invest in CSR, except under EDM. Therefore, we introduce an important function such that we have $\tilde{r}_H = \rho(r_H)r_H^*$, where $\rho(r_H)$ measures the degree of trust (or gullibility) of the consumer. It is decreasing and concave in r_H , $\rho(0) = 1$ and $\rho(\infty) = 0$ in order to avoid the possibility for firms to announce $r_H^* = \infty$. Firms know the existence of this characteristic but may not know exactly the function. So now, α measures precisely the “quality” of the communication. The introduction of this parameter allows also a SDM case to become

an EDM or a “quasi-EDM”, that is when $\alpha \simeq 1$. Under reasonable assumptions, one could think that communication costs are such that it is prohibitive to communicate when α is close to one.

With this additional function, can a firm announce $r = r_H^*$ without practicing any CSR? If this is not the case, this means that the possibility of revealing $r = r_H$ rules out the hard greenwashing.

From the previous results, we know that a firm that has sent $\alpha^{***} = \bar{\alpha}$ is necessarily a firm that has not practiced CSR. The consumer would therefore never buy a product in such case.

Result 5 *First, without $\rho(r_H)$, hard greenwashing is ruled out because confusion between pure greenwasher and CSR firms is impossible. This being due to the fact that no firm that has invested in CSR would send $\bar{\alpha} \geq \alpha^{***}$.*

However, $\rho(r_H)$ reintroduces the possibility of hard greenwashing because a possible misperception of this function by the firm.

This result is comparable to the one of Baron (2010b) that shows that under unconditional altruism, adverse selection prevents sorting. The misperception reintroduces adverse selection that prevents “green consumers” from interacting with “green firms”. Contrary to what Baron (2010b) finds, here this is the fact firms know exactly the consumers they face that prevents the hard greenwashing strategy because consumers revise their preferences.

Recall that α^{***} is given by inequality (4)

$$\alpha^{***} = \frac{-r_L}{(1 - x^*y^*)\rho(r_H)r_H - r_L}$$

So the gullibility has two effects. It makes the consumers harder to convince but it increases the communication limit above which the consumer is certain that there is greenwashing. So an important question that will be let for future research is the aggregation problem the firm is facing. If each consumer exhibits a different function $\rho(r_H)$, then a firm will have to differentiate the communication according to the public, if possible. Otherwise, a given strategy will necessarily oblige the firm to renounce to a share of consumers, those that are the most suspicious. This has to be taken into account for assessing the greenwashing strategy empirically.

3.5.2 Cues and CSR versus CSR alone

Hence, if a firm fears to face many suspicious consumers, she will not send a high level of cue. As it has been already shown, the incentive to send a cue depends on r_H . Except through announcing $r_H = \infty$, $\alpha < 1$ and an incentive to send a cue remains, this is guaranteed by the function $\rho(r_H)$. If it is much more expensive to send a cue, it is preferable to invest in CSR and *vice versa*.¹³

The very important question is to know whether the possibility to send a cue reduces the optimal level of CSR the firm chooses. Two very different stories are possible. First, we compare the situation in which the firm chooses the level of CSR and may send a cue but the consumer has not any information on it to the situation with revelation of the promised level of CSR if the CSR is realized. In this case, the presence of cues and the endogenous continuous level of CSR allow to diminish the level from which both efforts in hard information communication increase. As a consequence, it is not obvious that the presence of cues reduce the investment in CSR. It rather seems that both strategies behave similarly. In one case, without cues, the increase in r_H increases the ex ante congruence. In the other case, with cues, the increase in r_H combined with the incentives to communicate a cue increase the level from which both efforts increase.

However, those two situations are not exactly comparable. So we turn to the second story and compare models in which firms can commit to r_H^* if CSR is practiced and we consider the relative incentives of firms willing to practice CSR. As argued, the possibility of revealing r_H does not suppress all incentives to send cues. Moreover, if cues are relatively cheap compared to the investment in CSR, the firm may prefer a quite low level of r_H^* and sending a high cue. Hence, the possibility to send a cue, everything else equal, helps to sell its product with a lower level of CSR. In equation (6), α and r_H increases the effort in hard information communication. However, in that case, a larger cue may increase communication efforts as a larger r_H does it if cues are sendable.

¹³The cue and “announcing r_H before” are almost substitutes. Without the function $\rho(r_H)$, announcing a very large r_H would always be preferable to sending a cue since it is free. This however allows to introduce the distinction between the gullibility of the consumers and the reputation through communication of firms.

So two opposed effects are at work when the possibility of sending cues is introduced. According to the effect that dominates, the introduction of cues communication will increase or decrease the optimal investment in CSR of the firm. However, hard greenwashing is ruled out under our simplifying assumptions. It could be reintroduced as explained above. However, many effects would be at work that would necessitate to enter the black box of the determinants of the misperception (e.g. is this due to the geographic localization of known consumers: hard to know who see the advertising; or the consumers are unknown) as well as the effect of the misperception of the firm (an honest firm could be wrong but a greenwasher could also be wrong in its communication strategy). We let this for future research. For now, because of the result 5, hard greenwashing is ruled out and we show that the introduction may reduce the optimal level of CSR chosen by a firm but not necessarily. So cues and CSR may either be some complements or substitutes. In case of substitution, we call this light greenwashing and this the strategy we will seek to identify empirically.

Proposition 3 (Light greenwashing) *If r_H is continuous and endogenous, and if firms can ex ante commit to a level of r_H^* they pretend to have invested in, then the presence of cues reduces the optimal level of CSR.*

Proof. We start with the following lemma that states that under *No-Cue*, an increase of r_H has two opposed effects but that the overall effect is positive:

Lemma 2 *For $\rho(r_H) = \rho$, an increase of r_H decreases α and increases directly $R'(y)$, the overall effect is equal to*

$$\frac{\partial R'}{\partial r_H} = x^* \left(\frac{r_L}{\rho r_H - r_L} \right)^2 > 0 \quad (16)$$

and

$$\frac{\partial^2 R'}{\partial^2 r_H} = x^* \left(\frac{-2\rho r_L}{(r_H - r_L)^2} \right) \left(\frac{r_L}{r_H - r_L} \right) < 0 \quad (17)$$

so the positive effect is decreasing in r_H .

If $\rho(r_H)$ is not constant, then the first order derivative is equal to

$$\frac{\partial R'}{\partial r_H} = x^* \frac{r_L^2 + r_L r_H^2 \rho'(r_H)}{(\rho r_H - r_L)^2} > 0 \quad (18)$$

Then, consider first what happens if a firm announces \bar{r}_H when no cue can be sent. In that case, she spends a cost $s(\bar{r}_H)$. In parallel, from lemma 1, an increase in r_H increases the communication effort of the consumer; and an increase in $s(\bar{r}_H)$ reduces the communication effort of the firm.

Now consider a firm that announces $r_H^- < \bar{r}_H$. From above, the cost in investing in CSR is lower, so the effort the firm will make will be higher for the hard information. She will however send a cue. A lower r_H means a higher α^* . The effect on the effort of the consumer when passing from r_H^- to \bar{r}_H generates a positive but small effect from lemma 1.

As a consequence, the firm that can use a cue saves $s(\bar{r}_H) - s(r_H^-)$. She spends $S_c(\bar{\alpha})$ more. The effect on both efforts are ambiguous. Passing from \bar{r}_H to r_H^- implies that the firm effort is higher because of a higher reward and that the effort of the consumer is lower because of the smaller reward. Then, the difference between the two probabilities ultimately depends on the elasticity of investing in CSR. The higher it is, the higher the probability under r_H^- .

Therefore, if the cost of sending a cue is not too high, the firm choosing r_H^- may achieve the same utility under cue than a firm choosing \bar{r}_H under *No-Cue*. ■

We call this light greenwashing because firms keep investing in CSR, yet less than without cues. Several effects are at work. The cost functions are very important. Another very important effect passes through $\rho(r_H)$. Indeed, the effect on α is not monotonic by assumption. As a consequence, sending a high r_H^* may actually induce an increase of α^* . We have assumed this is not the case from now on. If it was the case, this would mean that firms face another problem that obliges them not to announce a too high level of CSR (and then not to invest in a high level of CSR).

This would switch the relationship presented above between the level of CSR and the cue communication. We have however seen that firms may want to send a cue larger than $\bar{\alpha}^*$, so this additional effect would not be of a great interest.

To conclude on the theoretical model, we propose a framework that encompasses both equilibria with an investment in CSR and light greenwashing. The cost function are very important in this model, as well as the productivity in CSR and the gullibility of consumers. We should note that the possibility of hard greenwashing is ruled out. The main prediction of the model is the dual effect of an increase in the level of CSR. It increases the reward for the consumer and the probability she will buy the product but it also raises incentives to practice light greenwashing.

As the next section will underline, finding some variables in order to measure, even imperfectly, the propensity to be a greenwasher, is a complicated task. The theoretical model provides clearcut conclusions on the CSR and greenwashing: yes CSR is more than communication, however greenwashing is a serious issue. First, there is always at least a minimum level of investment in CSR. Second, greenwashing could reduce investment in CSR, that could also lead to bad communication strategies by firms that have invested in CSR. This last effect being due to the problems of aggregation of the gullibility of the consumers as well as the problem of having a precise idea of its level for each consumer. Consequently, we will test empirically the key relationships among our three main variables (CSR, soft and hard information).

We can draw several testable implications. First, CSR and communication may be strategic complements if the level of CSR is high enough and the trust of consumers is sufficient. We will then expect a non-linear relationship between CSR and communication. Second, the cost of sending a hard information will be relatively lower if effective level of CSR is high. We expect a positive and linear relationship between CSR and the probability to send a hard information. Next sections of this paper are therefore an attempt to identify empirically and quantify greenwashing.

4 Data

In order to test empirically some implications of the theoretical model presented in the previous sections, we will use different data approximating the level of CSR and the level of communication related to CSR. According to the model, we need three sets of information (i) the effective level

of social responsibility for the firms, (ii) the “hard information” which is a reliable certification provided by the firm in order to give a clear assessment of the level of CSR to the consumers, (iii) the “cues” which is here the non-verifiable information or communication related to CSR provided by the firm, which can also be seen as advertising.

4.1 CSR, cues and hard information

The level of CSR will be approximated by the extra-financial rating provided by VIGEO for European firms. The use of these data are in our view the most reliable estimation of the effective level of CSR.¹⁴ Igalens and Gond (2005) showed the relevancy of VIGEO-ARESE¹⁵ data: “*a proxy that is particularly suitable for Corporate Social Performance, at least from a theoretical point of view*”¹⁶.

The most difficult challenge is to find an acceptable proxy of greenwashing and communication related to CSR. Here, we propose to use as a proxy of “soft information” the general level of communication or advertising on CSR. Unfortunately, it cannot be observed. Firms do not have a specific budget for “CSR advertising”. We could take the general advertising budget but this strategy won’t be satisfying as we cannot distinguish the firms with a specific strategy linked to social or environmental considerations. That is why we propose to use the general level of sustainable development reporting as a proxy of the general level of CSR communication.

¹⁴Cochran and Wood (1984) argued there are two generally accepted measures of CSR: the reputation index (Moskowitz, 1975) or content analysis (such as the data we use here). They found benefits and drawbacks for both methods. Tsoutsoura (2004) criticized the reputation indexes stating that “*it is unclear exactly what these indicators measure*”. Igalens and Gond (2005) add three other measures: the measurements based on analysis of the content of annual report, the pollution indices, the perceptual measurements derived from questionnaire based survey. Waddock and Graves (1997) drew upon the Kinder Lydenberg Domini (KLD) rating system and used these data to measure CSR. Tsoutsoura (2004) or Siegel and Vitalino (2007) used these measurements. VIGEO can be considered as the European counterpart of KLD with comparable methods. Igalens and Gond (2005) compared KLD and VIGEO-ARESE data and noted some distinctions explained mainly by different cultural sensitivities. Methodologically, they found that the scoring-quality proxy is always more favorable to the VIGEO-ARESE data (see Mattingly and Greening (1999) for a detailed analysis of KLD data.). More recently, authors proposed new tools for measuring corporate contribution to sustainability: the sustainable value-added (Figge and Hann, 2001) but there is no consensus on the relevance of such measurement (Korhonen, 2003)

¹⁵The analysis was done on the French extra-financial rating agency ARESE that has merged with VIGEO in 2002. We assume former ARESE data and VIGEO data are similar as the same methodology applies.

¹⁶However, they insist on the nuances introduced by the observation of the different sub-components of the index.

In parallel with the rise of social and environmental concerns, the number of extra-financial reports has exploded in the last years. These reports take various forms: environmental reports, health and security reports, social reports, integrated reports (combining financial and extra financial information)... To the contrary of the financial reports which are compulsory for the firms quoted in the stock-exchange, these extra-financial reports are not homogenized and are purely voluntary.¹⁷

Our hypothesis is that reporting is part of the overall communication related to CSR. As most of these reports are not certified, firms are free to communicate on a specific aspect of the social or environmental consequences of their activities. A firm may produce extensive reports but hide some crucial aspects which would be seen as negative by the consumers. In most cases, these reports are subjective and give a partial overview of the real CSR content of the products sold by the firm (thus echoing the theory of information dissimulation of Lyon and Maxwell (2010)). In many other cases, information is not verified (thus echoing the theory presented in this paper). Analyses of the content of the annual report have been used in the literature as a general proxy for corporate social performance (Dejean and Oxibar, 2003). However, as noted by Ullman (1985) and Igalens and Gond (2005), the analyses of annual reports involve more a measurement of “social discourse” than of CSR per se. It is clearly our hypothesis here. The difference between the “social discourse” and the CSR measured by VIGEO data will be then considered as a possible greenwashing.

It is possible to argue that consumers do not read these reports. This is not considered as a problem in our analysis. Consumers are represented by consumers’ organizations or other NGO that will survey these reports. The general public image of the firms will be influenced by the reports, and the opinion relayed by these NGOs. Furthermore, we can think that the “green advertising” will be strongly correlated by the general communication related to sustainable development, including the reporting activities.

The sustainable development reporting made some progress in the last years: different orga-

¹⁷We should notice the development of different laws at the European level concerning social and environmental reporting (ORSE, 2004) in recent years. However, the shape of such reports is not generally very well defined in the law and most of these laws do not stipulate sanctions.

nizations provided clear and homogenized guidelines. The Global Reporting Initiative (GRI) is probably the most famous, and is clearly supported by international organizations (United Nations). The GRI advises firms to certify their reports by an external source, and even proposes to check the consistency of these reports. Still a minority of firms decides to use this opportunity. Over the 593 firms of our sample, 406 have realized at least one sustainable development report but only 187 (31%) used the GRI guidelines and 86 (14%) realized an external certification of their report. We may consider that the external certification gives credibility to the report and has a higher probability to reveal the “real level” of CSR.¹⁸

Then, we propose an empirical distinction between “soft information” and “hard information”. Soft information will be measured by the general level of reporting. Hard information will be surrogated by asking an external certification for these reports. As the certification has a significant cost for the firms, we may suppose that firms with a deliberate strategy of greenwashing won’t pay this cost due to the lack of consistency of their CSR commitments. But they can publish sustainable development reports which will be seen as a specific form of communication.

4.2 Data on Corporate Social Responsibility

We propose to create an original index of the effective level of CSR based on VIGEO data. Vigeo is a European extra-financial rating company. Their ratings are used by SRI funds in order to choose the firms that meet the ethical criteria required by the actors. Their CSR evaluation is based on internationally recognised standards such as the conventions, recommendations, statements or guidelines of UN, ILO, UNEP, Global Compact or OECD. From these standards, Vigeo proposes different CSR principles of universal application translated into action steps for management. They propose 6 evaluation fields and 37 criteria. These fields are: (1) Human Rights, (2) Human Resources, (3) Environment, (4) Business Behaviour, (5) Community Involvement, and (6) Corporate Governance. These objectives are evaluated on the basis of about 200 action steps.

¹⁸However, some authors raised some critics against these external certifications which are not adapted to the specificity of extrafinancial information (Gillet, 2009).

VIGEO provided detailed data on 595 European firms¹⁹. These firms are included in the Dow Jones Stoxx 600 index, which includes the 600 biggest capitalizations at the European level.²⁰ Out of these 595 firms, 171 are from the United Kingdom, 88 are French and 52 are German. The banking and insurance sectors are the most represented in the sample, with respectively 64 and 35 firms.²¹

4.2.1 Principal Component Analysis (PCA)

The main goal of the analysis is to see whether we can observe global patterns of behaviour regarding different CSR aspects and to give an assessment of the global level of CSR according to the different items. Data analysis is a very useful methodology to reach these two main objectives. Igalens and Gond (2005) propose to use data analysis to evaluate the quality of the scoring. We will then use the same methodology to get global estimates of the general level of CSR.²²

The first axis can be interpreted as a proxy of the general level of CSR. We make this hypothesis considering the high correlation between each of the VIGEO items, except the community involvement, and the coordinates on the first axis. If we keep the definition retained by the European Commission, Corporate Social Responsibility is “*a concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis.*” (European Commission, 2006). The corollary of this definition is the fact that all social actions that are not directly linked to the core business of the company will not be assimilated as CSR. All actions related to the community involvement are not included in this definition. The correlation between the coordinates on the first axis and the performance in terms of Human Resources, Human Rights, Business Behaviour, and Environment is very high (around 0,80). This correlation is lower with corporate governance (which is a broader concept than the only CSR) and nil with the community involvement. The

¹⁹Vigeo is extending the coverage of the database to American and Asiatic firms. However, the coverage is not yet significant. We then limit our analysis to European firms.

²⁰We don't have exactly 600 firms in the database because of the exit or entry of some firms during the period.

²¹See Bazillier and Vauday (2009) for a more detailed description of the VIGEO data.

²²See Bazillier and Vauday (2009) for a more detailed presentation of the PCA results.

more negative is the coordinate on the first axis, the better is the CSR performance for the firm. According to this interpretation of the first axis, the best performances in terms of CSR are observed in France (-3,4), in the UK (-2,6) and in the Netherlands (-1,9). The worst performances are observed in Ireland (4,1), Iceland (2,6) and Austria (2,1). In terms of sectors, the best performances are observed in the chemical sectors (-3,1), in the automobile sector (-2,6) and in the energetic sector (-2,1). On the other side, the food sector (3,5), and the mechanical component sector (3,2) have the worst marks in terms of CSR performance.

The first axis does not give any information on the *kind* of CSR performed by the companies (except the fact we do not take into account actions related to the community involvement). As we only need an estimate of the global Corporate Social Responsibility, we will only use the score of the first axis.

In order to facilitate the interpretation of the index, we will transform the coordinates on the first axis into an index included between 0 (the worst performance in terms of CSR) and 1 (the best performance in terms of CSR). We call this variable RSENORM.

Table 1: Statistics of RSENORM

Mean	0.46
St. Dev.	0.21
Skewness	0.07
Kurtosis	2.31
	Percentiles
10 %	0.16
25 %	0.29
50 %	0.46
75 %	0.62
90 %	0.74

Table 2: Descriptive statistics: CSR reports

Variables	Mean	Std. Dev.	Min	Max
Number of Reports	4.82	4.95	0	29
Year of the first report	2001	4.03	1975	2008
Number of Pages (last report)	47.81	60.71	0	436
Number of Reports (per year)	0.58	0.62	0	2.4

Variable	Yes (%)	No (%)
Report	70.66%	29.34%
GRI	31.42%	68.58%
Global compact	12.94%	87.06%
AA1000	3.53%	96.47%

Source: Corporateregister.com, data collected by the authors

4.3 An estimation of the CSR-related communication: the level of *CSR-reporting*

We collected for each firm of our sample different information on their CSR reports. For this, we use Corporateregister.com which is a global directory of CSR resources, including a CSR report directory. Thanks to this directory, it is possible to determine whether or not the firms have already produced a report, how many reports were produced, how many pages each reports contain, the type of report and if the firm was member of Global Compact, GRI or AA1100. Of course, having numerous, extensive, reports does not mean as such that the company has a global strategy of greenwashing. However, thanks to the comparison with our first index of CSR, we are able to detect some “usual suspect” that have the specificity to have a huge reporting/communicating activity but a very low level of CSR.

From these data, we will build two measures of CSR-communication: **communication experience** (measured by the total number of reports) and the **communication effort** which is a combination of (1) number of reports per year and (2) the number of pages for the last report.

5 Empirical specification and results: who are the usual suspects?

In this section, we test empirically some of the model’s implications. First, we propose an estimate of the determinants of CSR measured by our index RSENORM in order to see if the communication behaviour has an influence on the level of CSR. Second, we estimate empirically the probability to follow the GRI guidelines and to ask for an external certification. In our model, these two variables are as proxies of the “hard information”.

5.1 Determinants of the level of CSR and influence of communication

According to the theoretical model, communication and CSR are strategic complements. However, if the maximum CSR level the firm can provide is too low, the firm will choose between investing in a lot in communication (a very high level of reporting); or investing neither in CSR nor in communication. The choice then depends on the communication costs. According to these predictions, we should observe a non-linear relationship between the effort of communication and CSR: if the communication effort is very high, it may be explained by a too low level of CSR and a substitutability between CSR and communication.

On the other side, hard information can be sent only if the level of CSR is sufficient (as the hard information reveals the real level of CSR). We then expect a positive relation between the proxy of hard information and CSR.

We propose the following estimable equation:

$$RSENORM = \alpha X + \beta X^2 + \gamma Y + \chi Z + \epsilon \tag{19}$$

RSENORM is the level of CSR measured by our index. X is a matrix of variables related to CSR communication: the number of reports per year and the number of pages measuring the effort of communication; and the total number of reports measuring the experience of commu-

Table 3: Prediction of the model: signs of the estimated coefficients

Variables	Estimated coefficient	Sign
X (cues)	α	+
X^2	β	-
Y (hard information)	γ	+

nication. α is the column vector of coefficients to be estimated associated to matrix X and β is the column vector of coefficients to be estimated associated to matrix X^2 . Y is the matrix of variables measuring the “hard information” in our model (here GRI, the fact to follow the GRI guidelines, and GRI+ if an external certification is asked by the firm). Z is the matrix of control variables including the sector and the country of the firm. The error term ϵ is assumed to be i.i.d. According to the model, α and γ should be positive and β should be negative (see table 3).

The results (table 4) are consistent with the theoretical framework. We observe a non-linear relation between the effort of communication and the level of CSR. GRI is positively correlated with the level of CSR. The estimated coefficient of GRI+ is not significant but this result can easily be explained by the strong correlation with GRI and by the weak number of observations for GRI+. An interesting result is that all our three measures of CSR take the expected sign. Concerning the proxy of CSR efforts, it can be explained by the fact that firms with very low level of CSR have an incentive either to not invest in communication or to invest a lot in communication (greenwashing). This latter case is represented in our results by the decreasing relation between CSR level and CSR communication beyond a certain turning point of communication. After this threshold, the lowest is the CSR, the highest will be the investment in communication.

Concerning the proxy of communication experience, this can be linked to one intuition of the model related to the respective level of CSR productivity and CSR. Our model suggests the intuition that a firm will have an incentive to decrease her level of CSR if her level of credibility is high enough. This increased credibility is explained by two aspects. The first one is an effect of “CSR efficiency”. The past investments in CSR will increase the efficiency of the current investment. The second one, not directly suggested by the model but relatively obvious here, is

an effect of reputation.

Table 4: OLS estimates of CSR

Dep. Var.	(1) RSE Norm	(2) RSE Norm
Number of Pages (last report)	0.000575*** (3.566)	0.00116*** (3.587)
[Number of Pages (last report)] ²		-2.28e-06** (-2.513)
Number of Reports (Total)	0.0143*** (5.465)	0.0204*** (3.939)
[Number of Reports (Total)] ²		-0.000669** (-2.571)
Number of Reports (per year)	0.0162 (1.045)	0.0573*** (2.698)
[Number of Reports (per year)] ²		-0.00322** (-2.587)
GRI	0.0933*** (4.096)	0.0661*** (2.850)
GRI +	0.00236 (0.0950)	0.0242 (1.017)
Constant	0.526*** (4.122)	0.506*** (3.938)
Observations	437	437
R-squared	0.583	0.615
Country-specific fixed effects	Yes	Yes
Sector fixed effects	Yes	Yes

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Lind and Mehlum (2007) consider that a significant quadratic term is a too weak criteria to confirm the existence of an inverted U-shape curve. They propose to check if the turning point is in the data interval and to test the slope on the interval's beginning and ending. They also propose to use a test developed by Sasabuchi (1980) which measures the significance of the inverted-U shape curve. Table 5 presents the result of these tests. The Sasabuchi test confirms

the existence of an inverted U-shape for our three variables of communication. The estimated turning point is always included in the interval.²³ The slope of the curve takes the expected sign in all cases.

Table 5: Test for U-shaped (Lind and Mehlum, 2007)

Var.	Number of pages (last report)	Number of reports	Number of reports (per year)
Interval.	[0,436]	[0,29]	[0,16]
Slope at lower bound	.0011566***	.0203654***	.0573447***
Slope at upper bound	-.0008318**	-.0184196**	-.0458403***
Sasabuchi Test for inverse U-shaped	1.60**	1.71**	2.40***
Turning Point	253	15	8.89
95% confidence interval for extreme point (Fieller method)	[189.26667; 613.08614]	[11.240029; 37.303151]	[7.8346199; 11.20915]

Note : With ***, ** and * respectively denoting significance at the 1%, 5% and 10% levels

5.2 The probability to send a “hard information”: interactions between the level of CSR and communication

“Hard information” in our model is approximated by GRI and GRI+. We test the probability to follow the GRI guidelines (GRI) or to ask for an external certification (realized by GRI or by a third-party: GRI+). We propose the following specification:

$$Prob(GRI = 1) = \phi RSENORM + \varphi X + \gamma Z + \epsilon \quad (20)$$

Two values of GRI will be tested: GRI takes the value of 1 if the firm follows the GRI guidelines. GRI+ takes the value of 1 only if the firm realizes an external certification of her report. RSENORM is our index of CSR and ϕ the estimated coefficient associated to RSENORM.

²³We should however notice that concerning the number of pages and total number of reports, the upper bound of the interval confidence with Fieller method is higher than the maximum value of the variable. The turning point could be outside the data rang even though Sasabuchi test is significant.

X is the matrix of variables related to CSR communication and φ the column vector associated to the matrix X . Z is a set of control variables (including the sector and the country of the firm). ϵ is the error term and is assumed to be i.i.d. Estimation are performed using a robust probit estimator.

Columns (1) and (3) of table 6 give the results of this estimation. Both communication and CSR are positively correlated with the probability to send a hard information. For GRI+, the number of pages (communication effort) and the total number of reports (communication experience) have a positive and significant impact on the probability to send a hard information. The fact that RSENORM is positively correlated with GRI and GRI+ can be explained, theoretically by the growing relation between r_H and the optimal effort of hard information communication (see equation 6).

The positive coefficient of the communication variables cannot be explained by the model: it is theoretically impossible to send a hard information if the level of CSR is nil. In our view, this result can be explained by the nature of the proxy we use here. The GRI variables are a proxy for hard information. However, they also bring information on the level of reporting. If the firm follows the GRI guidelines, the sustainable development report will take a specific form with a certain number of pages and a certain regularity. It is clearly a limitation of our data, as the hard information is, by definition, included in the cues. However, it is very difficult to find a proxy of hard information that will be uncorrelated with the cues.

To come back to the model, there is another effect that we did not take into consideration in this first set of estimation. If we look to equations (16) and (17), we can see that r_H affects negatively the effect of α on the optimal effort of hard information. This can be observed empirically by the inclusion of a term of interaction between communication variables and RSENORM. We then control for the direct effect of r_H on the optimal effort of hard information communication. And we want to measure a possible crossed effect of CSR and communication on the probability to send a hard information. More precisely, we suppose that the CSR level has an heterogeneous effect on the probability of sending a hard information. This heterogeneity can be modeled through random coefficient models but we choose a more simple hypothesis. Here, we suppose

that the heterogeneity is a function of the level of CSR communication (X). Thus, the final effect of CSR on the probability of sending a hard information will also depend on the respective level of communication.

We thus estimate the following equation:

$$Prob(GRI = 1) = \phi RSENORM + \varphi X + \eta X.RSENORM + \gamma Z + \epsilon \quad (21)$$

Results are given in column (2) and (4) of table 6. As suggested by the model, the coefficient of the interaction variable is significantly negative both for GRI+ (with the variable number of pages) and for GRI (with the variable number of report per year). If a firm makes CSR *and* communicates, increasing her level of CSR will decrease the cost of sending the optimal cue. In the model, this reduces the effort of communication from the consumers. At the equilibrium, this will also reduce the effort of communication (hard information) from the firm. The probability to send the hard information will thus be reduced.

However, the estimated coefficient of the interaction term should be interpreted cautiously. As shown by Ai and Norton (2003), the magnitude of the interaction effect in non-linear models is not equal to the marginal effect of the interaction term and can be of opposite sign. We use the methodology used by Ai and Norton (2003) to estimate correctly the magnitude and standard errors of the interaction effect. Our main result is confirmed. For the two significant interaction effects (CSR x Number of Pages for GRI+ and CSR x Number of Reports per year for GRI), the correct interaction effect is negative for almost all observations in the sample.

In both cases, the variable “total number of reports” measuring the communication experience is not significant when we add the interaction variables. We should also notice that the impact of the interaction term is significant for different communication variables according to dependant variable. For GRI+, the number of pages has a stronger explanative power while it is the number of reports per year for GRI.

Table 6: Probit estimates of hard information (GRI)

Dependant Variable	(1) GRI (checked)	(2) GRI (checked)	(3) GRI	(4) GRI
CSR	3.094*** (3.174)	4.213* (1.899)	3.206*** (4.324)	4.379*** (3.879)
Number of Pages (last report)	0.00479* (1.710)	0.0259*** (2.686)	0.0160*** (5.405)	0.00931 (1.061)
Number of Reports (per year)	0.127 (0.699)	0.760 (0.826)	0.264 (1.015)	2.119*** (2.732)
Total number of Reports	0.196*** (4.684)	0.0770 (0.558)	0.107*** (3.000)	-0.0145 (-0.148)
CSR x Number of Pages		-0.0333** (-2.194)		0.0110 (0.758)
CSR x Number of Reports per year		-1.006 (-0.782)		-3.076*** (-2.816)
CSR x Number of Reports		0.231 (0.927)		0.205 (1.245)
Constant	-3.981*** (-4.048)	-5.006*** (-3.548)	-1.519** (-2.194)	-1.324 (-1.636)
Country-specific fixed effects	Yes	Yes	Yes	Yes
Sector fixed effects	Yes	Yes	Yes	Yes
Observations	297	297	404	404
Robust z-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1				

6 Conclusions

The study of the greenwashing phenomenon is new in economics, and this paper provides some elements in order to characterize it both theoretically and empirically. We acknowledge that some of the assumptions, be they empirical or theoretical, may seem not exhaustive or even misleading. We however argue that there is a convergence between theoretical and empirical approaches towards the same conclusions. Some typical behaviours of greenwasher have indeed been identified.

First, hard greenwashing is not a realistic case, as the theory predicts when firms and consumers perfectly know the degree of gullibility of the consumers. Second and most importantly, the non-linearity between CSR and communication is theoretically predicted and empirically verified, confirming the light greenwashing strategy highlighted by the theory. The main prediction of the model is indeed the dual effect of an increase in the level of CSR. It increases the reward for the consumer and the probability it will buy the product but it also raises incentives to practice light greenwashing.

The CSR level is showed to affect positively the probability of sending “hard information” in order to convince sceptical consumers. However, the interaction variable between CSR and communication is negative. Theoretically, if a firm both invests in CSR and communicates and if this firm decides to increase her level of CSR, this reduces the cost of sending the optimal cue and then reduce the effort of communication. At the equilibrium, this also reduces the incentive for the firm to send a hard information.

The greenwashing strategy may indeed represent a serious issue for the development of CSR practices. Active consumers lobbies represent a solution in order to increase the transmission of the hard information and to decrease the cost of sending it for firms. Public regulation should also help reducing this phenomenon, as it appears that sectors under strong public scrutiny are not those that are tempted by greenwashing. So the trust of decision makers is as important as the one of consumers. A particular concern is that firms that used to be active in CSR may gain in credibility such that they will be in position to practice greenwashing easily. Hence, it is

highly important that following important efforts in CSR, regulations are set in order to avoid these firms to become too “lazy”.

This last point is echoing one of the results of Baron (2010b). He indeed shows that from a normative point of view, public regulation is increasing in the quality of self-regulation. We draw the same conclusion because one needs to prevent firms from reducing their CSR investment once they have reached a high level of credibility. So the higher the quality of the effort in CSR, the higher should be the publicly regulated threshold. He also shows that from a positive point of view a high level of self regulation should reduce the political support for public regulation. We suggest that because of greenwashing this could not be the case as the higher the effort in CSR, the higher the probability a firm will greenwash. Despite there are no dynamics in our model, there is indeed a strong presumption that former investments in CSR increase the credibility of a firm everything else being equal, thus increasing the opportunity of greenwashing.

We believe that putting the light on the greenwashing behaviour and highlighting how to detect it is the best way to circumvent it.

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