

# Can asymmetric information undermine the markets for ethical goods?

## A model of signaling with advertising

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### Abstract

In this paper, we investigate the possibility that a non-ethical firm may disguise itself as ethical in order to take advantage of the consumers' higher willingness to pay for ethical goods. Using a signaling model *à la* Spence, we show that this outcome is possible due to asymmetric information on the type of goods. We discuss the characteristics of this equilibrium outcome and we argue that it may jeopardize the functioning of the market for ethical goods. In this analytical framework, we consider the role of certification as a way to prevent such undesired outcome.

*Keywords: Asymmetric information, signaling, ethical goods*

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# 1 Introduction

In this paper, we investigate whether it is possible to find an equilibrium where both ethically and non-ethically produced goods coexist on the market, but consumers, because of asymmetric information, are not perfectly able to tell them apart. We believe this is an important issue: ethical goods are increasingly present in many different markets and a sizable amount of resources is devoted to make them available to consumers. However, while the reasons for the coexistence of ethical and non-ethical firms, even in the presence of higher costs associated to ethical goods, are clear in the case where consumers can distinguish between the two kinds of products<sup>1</sup>, the problems asymmetric information may pose in the market of ethical goods have not been systematically addressed. This point is relevant since the presence of asymmetric information could in principle jeopardize the main functioning of this type of market, since ethical and non-ethical goods are, in many cases, essentially indistinguishable, differently from what happens for goods whose quality is verifiable with consumption experience<sup>2</sup>. Therefore, the possibility arises that non-ethical goods are sold as ethical to profit from the higher consumers' willingness to pay for the latter. This may happen when unethical firms manage to mislead consumers' choice, for example by using appropriate advertising.

To prevent this kind of outcome, certification standards may be adopted, so as to certify when a firm is ethical or not<sup>3</sup>. The problem is whether and to which extent certification may prevent consumers' misperception. Practitioners, as well as scholars, point out some difficulties in order to assess the ethicality of a firm. Clearly, a rigorous and completely reliable certification can lead consumers to distinguish ethical and unethical firms. Indeed, in this case asymmetric information would be overcome. This is not the case, however, when auditors may be deceived and/or corrupted and consumers are

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<sup>1</sup>See e.g. Altman (2005a), pp. 749-751.

<sup>2</sup>This feature make the analysis of ethical goods different from that of experience goods, see e.g. Nelson (1970, 1974, 1978).

<sup>3</sup>We have in mind the SA8000 and other certification systems based e.g. on the Ethical Trading Initiatives Base Code, Nikes code of conduct, and Fair Trade.

aware of it. If this possibility is perceived as possible, then the role of certification may be reduced or biased.

The literature on this topic is, as a matter of fact, limited<sup>4</sup>. Altman (2005a) stresses out the importance for ethical goods to be clearly and reliably labeled. According to him, "operationally, what becomes critical here is the capacity and the ability to determine what an ethical firm is, and to provide for effective well-recognized labeling of such firms" (Altman, 2005a, p.749). In this passage, one can recognize two related issues: one is the possibility to *signal* to consumers an ethical good, and the other is to insure that this signaling is *credible*.

Clearly, credibility of signaling is a crucial issue for ethical goods. Indeed, in a response to some comments made to his analysis<sup>5</sup>, Altman (2005b, p.777) argues that "what is critical [...] is the high quality information with regards to the ethical dimension of the firm. [...] False claims perceived to be truthful yield unpreferred (sub-optimal) choices predicated upon deception and hence unethical behavior by firm members."

The issue has been addressed by Forstater, Weinreb and Zadek (1997), who point out that, despite of the standards, "problems of compliance remain with the Codes". Hiscox, Schwartz and Toffel (2008) devote their paper to the "strategies to overcome selection bias" when implementing SA8000. Katz, Higgins, Dickson and Eckman (2009) follow a different approach, examining financial performance and stock market reaction to the release of information on a company reputation, and conclude that that external monitoring is valuable to business and society by reducing information asymmetry.

In this paper, we are firstly concerned with the complementary issue raised by Altman, that is the role of signaling in determining the equilibrium outcome. We believe that this approach can capture in a clear way the role asymmetric information has in the analysis of trades in ethical goods, which has been overlooked in the analysis of Altman and in

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<sup>4</sup>We refer in particular to the literature on asymmetric information and ethical goods. More investigated is the link between asymmetric information and quality of products; see e.g. Kirmani and Rao (2000).

<sup>5</sup>See Cullis (2005), Colander (2005) and Levine (2005).

most of the literature on ethical goods.

In the second place we devote some further remarks to the analysis to the problem of unethical behavior and credibility, in particular on the role of the certification<sup>6</sup>.

To deal with these topics, we first reinterpret the model of signaling à la Spence (1973) as a model where firms selling ethical and non-ethical goods coexist on the market and where the possibility is open for an unethical firm to signal its good as ethical. In our analysis we abstract from the problem of potentially different production costs for ethical and unethical goods and we mainly concentrate on differences in signaling costs<sup>7</sup>. In particular, we assume that unethical firms incur in higher costs to signal its good as ethical, as compared to those that must be borne by an ethical firm. Indeed, a non-ethical firm that wishes to characterize itself as ethical must create an image based on evidence which actually is false, and this is clearly costly. Costs are here associated to the display of the features of an ethical firm when this is not true and also, in some cases, with costs of corruption of auditors<sup>8</sup>. However, since the higher costs borne by the unethical firm can be compensated by the higher price at which its goods can be sold, it may be possible that there exists an equilibrium where the unethical firm wishes to signal its goods as ethical. To verify when this is the case, we follow the equilibrium taxonomy which is standard for signaling models. In particular, we study the *separating* equilibrium, where ethical and non-ethical firms choose different level of advertising; the *pooling* equilibrium, where both types of firms will choose the same level of advertising; and finally we concentrate on the so-called *hybrid* or *semi-separating* equilibrium, where non-ethical firms will choose to randomize between signaling as non-ethical and signaling as ethical. We interpret this equilibrium as representing our idea that a non-ethical firm may disguise itself as ethical.

In this way, on the one hand, we can fruitfully complement Altman's analysis. Af-

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<sup>6</sup>We remark that Altman himself has stressed that "independent audits as well as monitored labeling system are critically important to optimal consumer choice" (see Altman, 2005, p.777).

<sup>7</sup>This assumption is made to simplify the formal analysis. We could extend our results to the case of different costs of production. The logical coherence of our assumption is easily preserved by assuming prohibitively high costs of converting a non-ethical firm into an ethical one.

<sup>8</sup>See e.g. Hiscox et al. (2008) and Forstater et al. (1997).

terwards, by analyzing a model where signaling is explicitly considered, we can make an in-depth analysis of the issues related to the credibility of signaling. We find that the higher costs that an unethical firm has to face in order to signal itself as ethical may prevent the emerging of pooling and hybrid equilibria as well of other types of equilibria where a wrong perception of the ethicality of a firm can arise. We argue that these costs are also related to the need, by part of the unethical firm, of circumventing certified monitoring.

The paper is organized as follows: in section 1, we describe the model. In section 2, we characterize and analyze the characteristics of the equilibria. In section 3, we perform a parametric analysis of the equilibria and relate it to the role of certification. In the conclusion section we present some final comments.

## 2 The model

We consider a situation where there are two (types of) firms: those selling (one unit of) ethical goods and those selling (one unit of) unethical goods. The consumers act as single receiver, namely as a unique market. The market willingness to pay for the ethical good is  $\theta_1$ , while that for the non-ethical good is  $\theta_2$ . In what follows, it is assumed that  $\theta_1 > \theta_2 > 0$  – hence the market willingness to pay for an ethical good is higher than for an unethical good. To simplify the analysis, and to concentrate on our main point, we abstract from the problem of production by assuming that each firm owns one unit of the good to be sold on the market. Each firm has to decide the price to accept for the good and the level of signaling, i.e. of advertisement, for its good<sup>9</sup>.

As explained in the introduction, we assume that firms selling the ethical product have lower (constant) marginal cost for advertising than unethical ones. The profits of firm  $i$  if it accepts to sell its good at a price  $p \geq 0$  and chooses a level of advertising  $a \geq 0$  is equal

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<sup>9</sup>The model presented here builds on Spence's signaling model as expounded in Gibbons (1992), section 4.2.B.

to:

$$\pi_i(p, a) = p - c_i a. \quad (1)$$

By letting  $i = 1$  denote the ethical firm and  $i = 2$  the non-ethical firm, the aforementioned assumption on marginal cost implies that  $c_1 < c_2$ .

### 3 The equilibrium outcome

The equilibrium concept we use is the perfect Bayesian equilibrium (PBE)<sup>10</sup>. The strategic interaction can be described as follows: one firm is perceived as ethical with some exogenous probability  $r$  or unethical with probability  $1 - r$ . Given its type, which is private information, the firm chooses a level of advertising, or signaling,  $a$ . As supposed in the previous section, the consumer acts as a single receiver, namely as a unique market. The market observes the signal, but not whether the firm is actually ethical or not and it assigns to each firm  $i$  ( $i = 1, 2$ ) a probability it to be ethical. This is a conditional probability, given the observed level of advertising made by both the firms, and therefore we let  $\mu(\theta_1|a)$  denote the probability that a firm is ethical given that it chooses a level of advertising  $a$ <sup>11</sup>.

After observing  $a$ , the market makes a price offer for one unit of the good sold by the firm. The payoff of the market is given by  $-(\theta - p)^2$ , where  $\theta = \theta_1$  if the good is ethical and  $\theta = \theta_2$  if the good is unethical. The market, i.e. the consumers, payoff is therefore decreasing in the price paid for the good.<sup>12</sup> To maximize its expected payoff, the market will offer a price  $p(a)$ , which depends on the observed signal. In particular, it will solve

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<sup>10</sup>See for instance Gibbons (1992), p.188.

<sup>11</sup>We follow Gibbons notation on conditional probabilities, where  $\mu(\theta_1|a)$  represents the probability that a firm is ethical given that it chooses a level of advertising *for a given level of advertising of the other firm*. This entails that such a level has to be specified at each stage of the analysis. Obviously, a more explicit notation could be adopted; however, for simplicity we chose to be in line with our original source. Moreover, we stress the fact that in this notation we indicate the type of the firm referring to the price consumers are willing to pay to the two types of firm.

<sup>12</sup>See Gibbons (1992, p.193) for an additional discussion about this type of payoff. Here, the payoff depends on the difference between the willingness to pay and the actual price of the good.

the following problem:

$$\max_p - \left( \mu(\theta_1|a)(\theta_1 - p)^2 + \mu(\theta_2|a)(\theta_2 - p)^2 \right)$$

By differentiating with respect to  $p$ , we obtain the necessary and sufficient condition  $\mu(\theta_1|a)(\theta_1 - p) + \mu(\theta_2|a)(\theta_2 - p) = 0$ , which then gives

$$p(a) = \mu(\theta_1|a)\theta_1 + \mu(\theta_2|a)\theta_2. \quad (2)$$

Therefore, the price consumers are ready to offer is an average of the different willingness to pay, weighted by the conditional probabilities. Given the level of advertising, the the firm accepts the highest price offered by the market and its payoff is given by equation (1).

As explained in the introduction, while we are ultimately interested in a separating equilibrium, we briefly discuss how the semi-separating or hybrid equilibrium and the pooling equilibria look like in the present set-up. Moreover, we refer to the possibility that other type of equilibria may prevail.

The game outcome, of course, depends on the shape of the consumer beliefs. The way consumers shape their beliefs is important in order to detect and characterize the equilibria of the game, because the firm has to trade-off the price it can charge to consumers (given by equation (2)) with the higher costs of advertising. The point is that price could increase in a more or less proportional way of the costs. In the sequel, we will adopt beliefs of the type considered by Gibbons (1992), which are in the stream of the original work of Spence (1973). At the end of analysis, we will return on this issue, in order to consider in a qualitative way a wider class of beliefs.

### 3.1 The separating equilibrium (S)

In a separating equilibrium, the level of advertisement is different for the two types of firm,  $a_1^* \neq a_2^*$ , where starred variables denote equilibrium levels. To characterize them, we proceed in steps. First of all, we recall that the consistency requirements on markets beliefs imply that, in a separating equilibrium,

$$\mu(\theta_1 | a_1^*) = \mu(\theta_2 | a_2^*) = 1.$$

We have still to specify consumers beliefs regarding out of equilibrium advertising choices, i.e. for values of  $a$  different from  $a_1^*, a_2^*$ , and to show that the best response for firm  $i$  to consumer price offer as in (2) is to choose  $a = a_i^*$  for  $i = 1, 2$ .

One possible belief that fulfill these conditions is that the firm is ethical if  $a \geq a_1^*$  and non-ethical otherwise, so that  $\mu(\theta_1 | a) = 0$  for  $a < a_1^*$  and  $\mu(\theta_1 | a) = 1$  otherwise. From (2), it then follows that  $p(a_1^*) = \theta_1$  and  $p(a_2^*) = \theta_2$ . This fact then implies that  $a_2^* = 0$ , hence that non-ethical firms choose the lowest possible level of advertising. To see that this is the case, notice that non-ethical firms will receive, in a separating equilibrium, a price offer equal to  $\theta_2$  whatever their level of advertising (which of course must be different from  $a_1$ ). Since advertising is costly and revenues from sales in this case do not depend on it, non-ethical firms will clearly choose  $a_2^* = 0$ . To characterize the equilibrium level of advertising for the ethical firm, we use the property of absence of profitable deviations, given the market price offers. This property in particular implies that the following inequalities must hold:

$$\pi_1(p_1^*, a_1^*) \geq \pi_1(p_2^*, a_2^*) \quad \text{and} \quad \pi_2(p_2^*, a_2^*) \geq \pi_2(p_1^*, a_1^*).$$

Rewriting them in terms of the parameters gives the characterization of the equilibrium

level of advertising for the ethical firm, which is clearly strictly positive:

$$\frac{\theta_1 - \theta_2}{c_1} \geq a_1^* \geq \frac{\theta_1 - \theta_2}{c_2} \quad (3)$$

### 3.2 The pooling equilibrium (P)

In a pooling equilibrium, both type of firms choose the same level of advertising  $a_p^*$ . This implies that consumers are not able to tell the firms apart and therefore the price they are willing to pay to a firm which chooses an advertising level  $a_p^*$  is equal to:

$$p_p^* \equiv p(a_p^*) = r\theta_1 + (1 - r)\theta_2,$$

where  $r$  is the prior belief that a firm is ethical. To determine the off-equilibrium beliefs, we simply let  $\mu(\theta_1 | a) = r$  if  $a = a_p^*$  and  $\mu(\theta_1 | a) = 0$  if  $a \neq a_p^*$ . These beliefs imply that when a firm chooses a level of advertisement different from  $a_p^*$ , the market assumes it is unethical. In this case, (2) implies that  $p^* \equiv p(a) = \theta_2$  is offered to any firm choosing  $a \neq a_p^*$ . By the same reasoning as in the previous paragraph, in this case if a firm optimally chooses  $a^* \neq a_p^*$ , then it must be that  $a^* = 0$ . This observation then allows us to characterize the level of advertising that arises in this type of pooling equilibrium. Indeed, since there must not be any profitable deviation, the following inequality must hold:

$$\pi_1(p_p^*, a_p^*) \geq \pi_1(p^*, a^*) \quad \text{and} \quad \pi_2(p_p^*, a_p^*) \geq \pi_2(p^*, a^*),$$

and therefore  $a_p^*$  is such that:

$$0 \leq a_p^* \leq \frac{p_p^* - p^*}{c_2} = \frac{r(\theta_1 - \theta_2)}{c_2}.$$

### 3.3 The semi-separating (or hybrid) equilibrium (H)

Suppose now that non-ethical firms are willing to randomize between two advertising levels,  $a_s^*$  and  $a_2^*$ , while ethical firms choose  $a_s^*$  with certainty. In this case, a semi-separating or hybrid equilibrium arises<sup>13</sup>. When consumers observe a level of advertising equal to  $a_2^*$ , then the equilibrium restrictions on beliefs imply that  $\mu(\theta_2 | a_2^*) = 1$ . However, when they observe a firm with a level of advertising  $a_s^*$ , the equilibrium restrictions on beliefs imply that:

$$\mu(\theta_1 | a_s^*) = \frac{r}{r + (1 - r)\sigma} ,$$

where  $r$  is the prior belief that a firm is ethical and  $\sigma$  is the (equilibrium) probability that a non-ethical firm chooses a level of advertising equal to  $a_s^*$ , thus trying to disguise itself as an ethical firm. In this case, out-of-equilibrium beliefs that sustain this type of outcome are as follows:  $\mu(\theta_1 | a) = 0$  if  $a < a_s^*$  and  $\mu(\theta_1 | a) = r / (r + (1 - r)\sigma)$  if  $a \geq a_s^*$ .

While it is easy to show that also in this case  $a_2^* = 0$  and  $p_2^* = \theta_2$ , for a non-ethical firm to be willing to randomize between a given  $a_s^*$  and  $a_2^*$  its payoffs must be equal in the two cases. Therefore, it is necessary that the price  $p_s^* \equiv p(a_s^*)$  consumers are ready to offer if they observe an advertising level  $a_s^*$  satisfies  $\pi_2(p_s^*, a_s^*) = \pi_2(p_2^*, a_2^*)$ . This condition in turn implies that  $p_s^* = \theta_2 + c_2 a_s^* > \theta_2$  whenever  $a_s^* > 0$ . On the other hand, given the equilibrium beliefs, the price paid to firms which choose an advertising level  $a_s^*$  must satisfy:

$$p_s^* = \mu(\theta_1 | a_s^*) \theta_1 + (1 - \mu(\theta_1 | a_s^*)) \theta_2 . \quad (4)$$

Therefore, provided that  $p_s^* < \theta_1$  for a given  $a_s^*$ , equation (4) determines the unique value of  $\sigma$  consistent with a semi-separating equilibrium. By standard calculations, and using the value of  $\mu(\theta_1 | a_s^*)$  as above computed, it is possible to verify that  $0 < \sigma < 1$  for any  $p_s^* < \theta_1$ , which confirms that this case is indeed consistent<sup>14</sup>. We also notice that  $p_s^* < \theta_1$

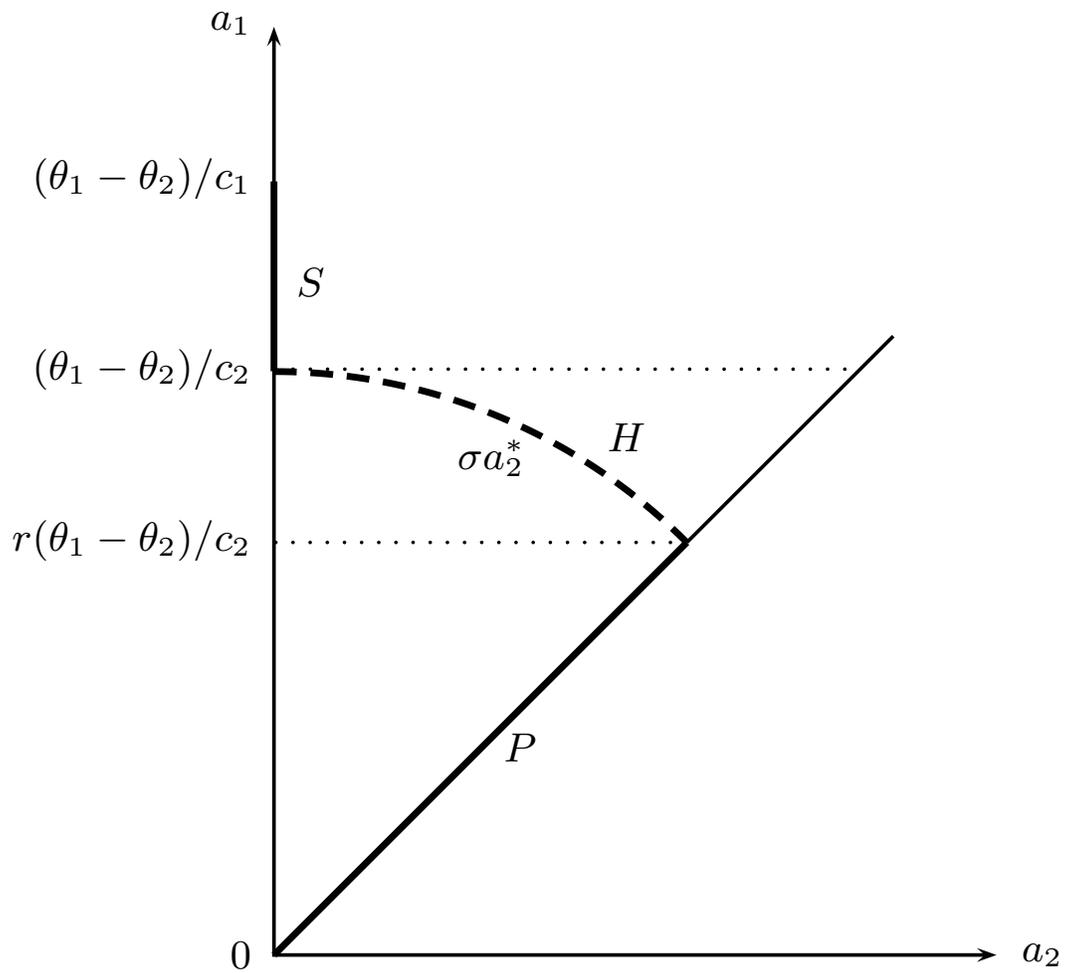
<sup>13</sup>See e.g. Gibbons (1992), p.203.

<sup>14</sup>As noted by Gibbons (1992, p.203), this is the condition that actually guarantees the existence of a

implies that  $a_s^* < a_1^*$ , where the latter is the level of advertising chosen by the ethical firms in the separating equilibrium.

### 3.4 Graphical representation

At the end of our analysis we can represent in a picture the equilibria S, P and H. We depict them in the  $(a_1, a_2)$  plane, as to show the interaction of the advertising of the two firms.




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hybrid equilibrium.

In the picture above, the zones S (separating) and P (pooling) are the segments indicated by the bold lines. The H region, which is contained between the two dotted lines, indicates the region where  $a_2$  vary randomly with probability  $\sigma$ . The dashed line denoted by  $\sigma a_2^*$  represents the average value of the strategy played by firm 2. By computation we obtain that if  $a_2 = (\theta_1 - \theta_2)/c_2$ , then  $\sigma = 0$ , whereas when  $a_2 = r(\theta_1 - \theta_2)/c_2$ , then  $\sigma = 1$  and hence  $\sigma a_2 = r(\theta_1 - \theta_2)/c_2$ .

### 3.5 Parametrical analysis of the equilibria

Our interest lies in the conditions which let a separating equilibrium prevail. A pooling equilibrium, in fact, makes the two kind of firms indistinguishable, whereas in a hybrid equilibrium the unethical firm can be perceived erroneously as ethical. The discussion in the introduction enlightens this point.

A separating equilibrium simply emerges whenever firm 1 puts  $a_1^* \geq (\theta_1 - \theta_2)/c_2$ . Firm 1 will do this if and only if the profit it obtains in S is greater than the profit it achieves in H and P. More precisely, the maximum profit in S (which emerges for  $a_1 = r(\theta_1 - \theta_2)/c_2$ ) must be greater than the maximum profit in P (which emerges for  $a_1 = 0$ ) and the maximum average profit in H (which occurs when  $a_1 = r(\theta_1 - \theta_2)/c_2$ ). By means of routine computation we obtain the necessary and sufficient condition for a separating equilibrium to occur as

$$r < 1 - (c_1/c_2).$$

This happens whenever  $c_2$  is sufficiently greater than  $c_1$ , i.e. if the cost for advertising for firm 2 is greater enough as compared to the cost of advertising for firm 1. This is related to the cost of certification for an unethical firm. The implications will be discussed in the conclusions.

### 3.6 A qualitative discussion on different kinds of beliefs

Let us observe that the beliefs we have adopted are shaped such in a way that they dramatically cut the price a firm can obtain outside of each type of equilibrium. This entails that a firm doesn't have incentive to increase its advertising to a greater level than the other firm, because its profit would dramatically decrease. We can observe that such a kind of beliefs are somehow "cautious", in the sense that the consumer is not willing to offer a high price whenever she observes a level of advertising different from the equilibrium one.

With this kind of beliefs, we have shown when hybrid equilibria may emerge where the firm can disguise as ethical. We have therefore analyzed the conditions that prevent this outcome, i.e. the conditions in which the equilibrium separating can emerge.

However, the question arises whether it is still possible to prevent perverse equilibrium when the belief belong to a larger class. The matter requires deep investigation, and therefore will be object of future work. We give here some intuition, as to show that high advertising costs for the unethical firm may prevent undesired outcomes.

As a matter of fact, a wider class of beliefs of the "cautious" type may emerge, namely beliefs such that, when for instance  $a_2$  becomes greater than  $a_1$ , then the belief that the firm 2 is ethical (and the price offered to firm 2) increases, but less than proportionally with respect to the costs, thus inducing the firm not to propose itself as ethical more than the other firm<sup>15</sup>. In this case a very high value of  $c_2$  should be sufficient to prevent the game to be played at the right side of the bisecting line in the above picture, and we would achieve a result similar to that in the previous analysis. In this case, wrong perception of the firms by part of the consumer (i.e. the unethical firm is perceived as ethical and the ethical firm as unethical) is limited to the hybrid equilibrium, where the unethical firm is perceived as ethical the  $\sigma\%$  of times.

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<sup>15</sup>Observe that all this is contingent to entire set of parameters of the model. The Spence-Gibbons assumption is a way to work with "cautious" beliefs independently from parameters.

Another possibility is that the beliefs are "incautious", i.e. such that, when  $a_2$  becomes greater than  $a_1$ , then the effect of market price prevails over the costs and firm 2 has an incentive as to increase its advertising more than the ethical firm. This situation may produce an equilibrium where the unethical firm is perceived as ethical (and the ethical firm as unethical) for the 100% of times. While leave this issues for future work, we observe here that also in this case a very high cost  $c_2$  may prevent this kind of wrong perception.

## 4 Conclusions

In this paper, we have investigated the possibility that a non-ethical firm may disguise itself as ethical in order to take advantage of the consumers' higher willingness to pay for ethical goods. We have shown that this outcome is possible due to the asymmetric information on the type of goods, since those that are not ethical cannot be recognized even after consuming them.

This outcome may jeopardize the market for ethical goods, since consumers, once they become aware of it, will not trust ethical goods any longer. Therefore, the problem of credibility in markets for ethical goods arises. This observation leads us to the problem of reliability of the certification practices.

Our analysis shows that the greater costs of signaling encountered by the unethical firm can avoid the emerging of equilibria with improper perception by part of the consumer about the ethicality of the firms.

We have related the cost of signaling to the state of a firm: the unethical firm pays more as to make its signal and advertise. We argument that this higher cost is also linked to the cost of certification for the unethical firm.

Fooling the auditors, exhibiting false production conditions, has a cost which depends on the production features. Moreover, we may consider the costs of corruption, in terms

of the bribe that the unethical firm has to pay to auditors.

Under a rationality assumption, we can conjecture that the corruption bribe is the half of the profits improperly gained by the unethical firm. But the bribe might be different, if many unethical firms were present, favorably disposed to buy the compliance of corruptible auditors.

Thus we are unable to state if the additional costs faced by an unethical firm are high enough in order to induce a complete separation between ethical and unethical firms. Certainly, certification reduces information asymmetry, because the unethical firm has less incentive to make signals. Surely, a complete separation wouldn't be possible in the absence of a certification system, whose role for the assessing of an ethical market remains therefore fundamental.

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