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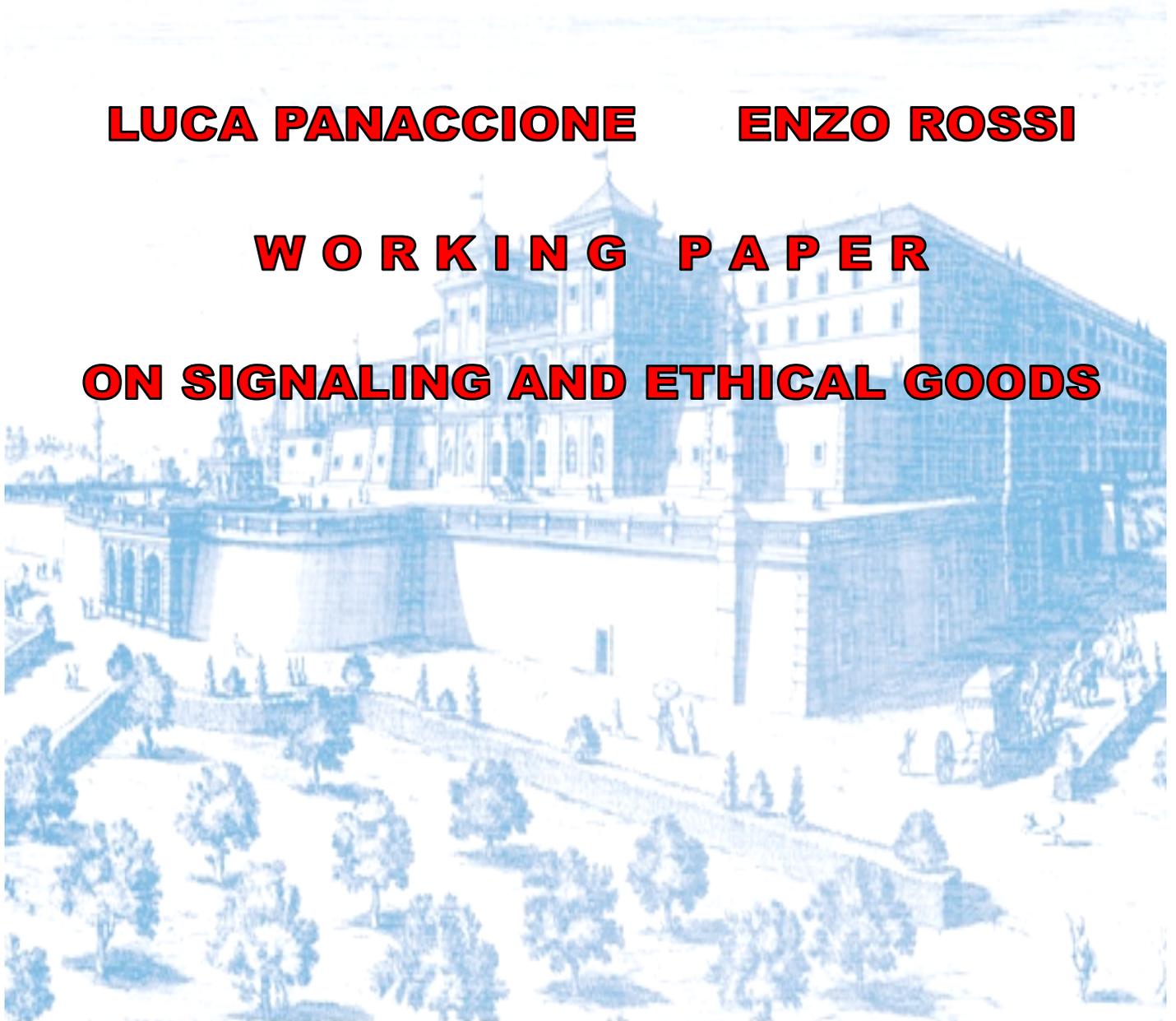


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WORKING PAPER

ON SIGNALING AND ETHICAL GOODS



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On signaling and ethical goods

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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 indeed possible due to the 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.

1 Introduction

In this paper, we investigate whether it is possible to find a strategic mechanism which results in an equilibrium where both ethically and non-ethically produced goods coexists on the market, but consumers, because of imperfect and therefore 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

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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 products¹, 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 experience². Therefore, the possibility arises that non-ethical goods are sold as ethical to profit from the higher consumers' willingness to pay for the latter type of commodities.

The literature on this topic is, as a matter of fact, limited³. 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 analysis⁴, 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." While we devote part of the concluding comments to the problem of unethical behavior and credibility, in this

¹See e.g. Altman (2005a), pp. 749-751.

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

³We 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).

⁴See Cullis (2005), Colander (2005) and Levine (2005).

paper we are primarily 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 most of the literature on ethical goods.

To this end, we 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 costs⁵. 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 is manifestly false, and this is clearly costly.⁶ 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. On the

⁵This 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.

⁶See e.g. Hiscox *et al.* (2008) and Forstater *et al.* (1997).

other hand, by analyzing a model where signaling is explicitly considered, we can make a first step toward the analysis of the issues related to the credibility of signaling.

The paper is organized as follows: in section 2, we describe the model. In section 3, we characterize the equilibrium outcome. In section 4, we present some concluding 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 market willingness to pay for the ethical good is θ_1 , while that for the non-ethical good is θ_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 good⁷.

As explained in the introduction, we assume that firms selling the ethical product have lower (constant) marginal cost for advertising than unethical ones. The profit for 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 to:

$$\pi_i(p, a) = p - c_i a. \tag{1}$$

By letting $i = 1$ denote the ethical firm and $i = 2$ the non-ethical firm, the aforementioned assumption on marginal cost implies that $c_1 < c_2$. This implies, in particular, that iso-profit curves are steeper for type-2 than for type-1 firms.

⁷The model presented here builds on Spence's signaling model as expounded in Gibbons (1992), section 4.2.B.

3 The equilibrium outcome

The equilibrium concept we use is the perfect Bayesian equilibrium (PBE)⁸. 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 . The market observes the signal, but not whether the firm is actually ethical or not. Given the observed signal, the market adjusts its assessment on the probability that a firm is ethical or not. We let $\mu(\theta_1|a)$ denote the probability that a firm is ethical given that it chooses a level of advertising a . 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.⁹ To maximize its expected payoff, the market will offer a price $p(a)$, which depends on the observed signal. In particular, it will solve 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 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 semi-separating

⁸See Gibbons (1992), p.188.

⁹See Gibbons (1992, p.193) for an explanation of the assumptions which may justify this type of payoff.

or hybrid equilibrium, we briefly discuss how the separating and the pooling equilibria look like in the present set-up.

3.1 The separating equilibrium

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 these levels, we proceed in steps. First of all, we recall that the consistency requirements on markets beliefs imply that, in a separating equilibrium, $\mu(\theta_1 | a_1^*) = \mu(\theta_2 | a_2^*) = 1$. From (2), it 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 θ_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:

$$\frac{\theta_1 - \theta_2}{c_1} \geq a_1^* \geq \frac{\theta_1 - \theta_2}{c_2} \tag{3}$$

3.2 The pooling equilibrium

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 assume for simplicity that $\mu(\theta_2 | a) = 1$ when $a \neq a_p^*$. This implies in particular that when an advertisement level different from a_p^* is chosen by some firm, the market assumes that this firm 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

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 arises¹⁰. 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 σ 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.

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 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 σ 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 consistent¹¹. We also notice that $p_s^* < \theta_1$ implies that $a_s^* < a_1^*$, where the latter is the level of advertising chosen by the ethical firms in the separating equilibrium.

¹⁰See e.g. Gibbons (1992), p.203.

¹¹As noted by Gibbons (1992, p.203), this is the condition that actually guarantees the existence of a hybrid equilibrium.

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 which 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.¹² This observation lead us to the problem of reliability of the certification practices. This is of course a crucial issue, that involves theoretical issues and evidence about actual practices.¹³ However, given its complexity, we leave it for fruitful future research.

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¹²We 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).

¹³See e.g. Hiscox *et al.* (2008) and Forstater *et al.* (1997).

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