Corporate social responsibility and profit maximising behaviour under consumer tastes uncertainty

ABSTRACT

We extend the traditional horizontal differentiation models to the analysis of firm location into the space of corporate social responsibility (CSR) in presence of consumers with heterogeneous tastes and willingness to pay for it. We find that nonzero corporate social responsibility, even when modelled as a pure cost, may be an optimal choice for profit maximising producers is conditional to CSR costs, consumers' sensitiveness for CSR and uncertainty about consumer tastes.

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1 Introduction

Corporate social responsibility is an increasingly debated issue in contemporary market economies.[1] A simple way of modelling this novel feature of the economic environment is within differentiation models by reinterpreting the Hotelling segment [2] as the space of both firm CSR behaviour and heterogeneous consumers' CSR beliefs.[3] On the corporate side, abstracting from the problem of informational asymmetries and assuming that CSR is not a "free lunch", we can model it as the payment of a variable premium over input costs.[4] Within this framework we are interested to evaluate whether firms may find it optimal to

[1] KPMG (2005) reports that in the year 2005 52 percent of the top 100 corporations in the 16 more industrialised countries published a CSR report. In a recent survey the "2003 Corporate social responsibility monitor" (downloadable at http://www.bsdglobal.com/issues/sr.asp) finds that the amount of consumers looking at social responsibility in their choices jumped from 36 percent in 1999 to 62 percent in 2001 in Europe.

[2] For a reference to the traditional literature on horizontal product differentiation see Hotelling, (1929), D'Aspremont, Gabsewicz and Thisse (1979), Economides (1984), Dasgupta and Maskin (1986), while for vertical differentiation the seminal paper of Shaked and Sutton (1983).

[3] Empirical support for our hypothesis on the heterogeneity of individual attitudes toward social responsibility is confirmed by descriptive evidence from the World Value Survey database containing representative samples of 30 (7) different countries for a total of 65,660 (15,443) individuals interviewed between 1980 and 1990 (1990 and 2000). In both surveys around 45 (49) percent of sample respondents declare that they are not willing to pay in excess for environmentally responsible features of a product. The same survey documents that the share of those arguing that the poor are to be blamed is around 29 percent in both surveys. This simple evidence confirms the existing heterogeneity in the willingness to pay for social and environmental responsibility, rejecting the assumption that more of SR may be better for all individuals.

[4] This generalisation may include cases of efficiency wages, other types of higher monetary and non monetary benefits for workers, the adoption of environmental friendly but more costly productive processes, the introduction of code of conducts for the relationship with

choose CSR even when it is modelled as a pure cost. To do so we identify the optimal location choices in a duopoly in which firms maximise profits and are uncertain about consumer ethical tastes. The closer reference in the literature to our model is that of De Palma, Ginsburgh, Papageorgiou and Thisse (1985), who calculate optimal location in a simple location horizontal differentiation model a la Hotelling in presence of uncertainty about consumer tastes. A part for the economic motivation and the relevance of the new phenomenon explained above, the difference of our approach, on the analytical point of view, is that, in our case, the Hotelling segment is "inclined" for producers: moving rightward is costly as it implies paying higher SR costs.

2 The location model

Consumers have inelastic unit demands and are uniformly distributed along the [0, 1] interval of the SR space X. The duopolists locate on the point ($x \in [0, 1]$) of the segment according to their degree of SR. On the right boundary of the SR space producers pay the maximum amount of SR costs s, with non SR costs being set to zero - as in De Palma et al. (1985) - without lack of generality. Hence, as far as producers move rightward, they become more SR and pay a higher x-portion of the maximum cost s. Consumer locations are denoted by $x \in X$. and measured as distances from the origin of the segment. The product is sold at a given price p.

We formulate the utility function of a consumer located in x purchasing from firm i as follows:

$$v_i[x] = b - p - f\,|x - x_i| \tag{1}$$

where b is the consumer's reservation value of the product when his ethical standards coincide with those incorporated in the product and f is the weight given to the disutility of consuming a product whose ethical standards are below one's own standards.

Firms can not predict consumers' behaviour a priori, but they can determine the utility of a consumer located in x up to a probability distribution:

$$u_i[x] = v_i[x] + \mu\varepsilon_i \tag{2}$$

where ε_i is a random variable with zero mean and unit variance and μ is a positive constant which gives different weight to the unknown terms of the probabilistic utility function. Differently from De Palma et al. (1985) in our model uncertainty concerns consumer ethical beliefs which can not be observed with precision by producers. The larger is μ, the more relevant is the stochastic term of the utility function.

subcontractors, etc. The assumption is also consistent with CSR standards set by the most established screening bodies (see for instance criteria of the Kinder, Lydenberg and Domini Research).

We assume that the terms ε_i are identically, independently Weibull-distributed, so the probability that a consumer located in x will buy from firm i is:

$$P_i[x] = \frac{e^{(b-p-f|x-x_i|)/\mu}}{\sum_{j=1}^{2} e^{(b-p-f|x-xj|)/\mu}} \tag{3}$$

If the two firms choose different locations, there will be three regions on the ethical segment. We define the probabilities for a consumer located in the regions 1, 2 or 3 to purchase from firm 1 as follows:

$$P_1^1 = \frac{1}{1+H}, \qquad P_1^2 = \frac{1}{1+e^{-(f/\mu)(\delta+2(x_1-x))}}, \qquad P_1^3 = \frac{1}{1+K} \tag{4}$$

where $\delta = |x_1 - x_2|$, $H = \exp(-f\delta/\mu)$ and $K = \exp(f\delta/\mu)$. So the first and the last probabilities are constant, while the second is decreasing since $\frac{\partial P_1^2}{\partial x} < 0$. By evaluating the second derivative we can find the inflexion point $\overline{x} = x_1 + \frac{\delta}{2}$.

For $x_1 < x < x_1 + \frac{\delta}{2}$ the probability function is concave and for $x_1 + \frac{\delta}{2} < x < x_2$ it is convex, but its shape depends also on the value of μ.The higher is μ, the flatter is the function as it is showed in figure 1.

Definition: We define an Agglomerated Nash Equilibrium (ANE) as a Nash equilibrium in which locations of the two players coincide. Using this definition we formulate the following proposition.

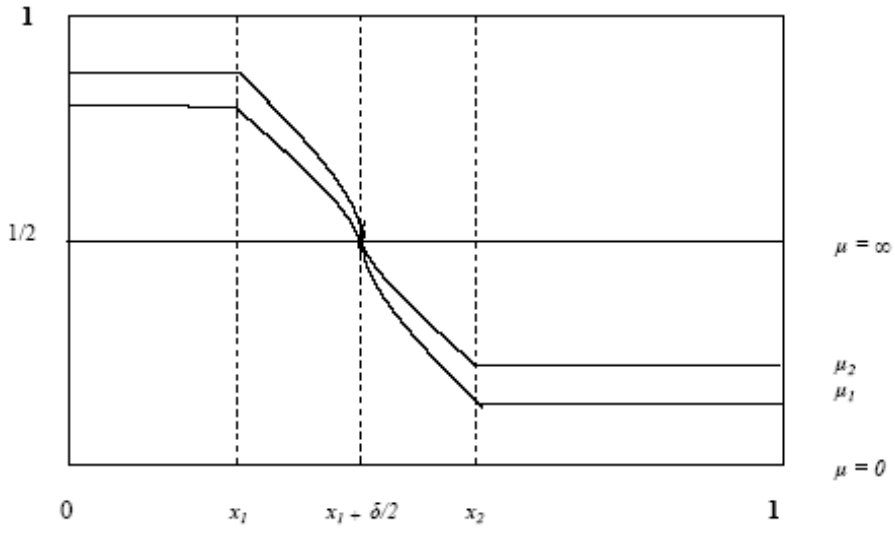

Figure 1

Proposition 1: A location maximization problem of two competing PMPs in a market with ethical consumers has a unique (Agglomerated) Nash Location Equilibrium given by $x_1 = x_2 = \frac{1}{2} - \frac{2\mu s}{c}$.

Proof:

Given assumptions 1 and 2 and letting $p = 1$, we can evaluate the profit for one of the firms as follows:

$$\pi_1 = \int_0^{x_1} P_1^1[x]dx + \int_{x_1}^{x_2} P_1^2[x]dx + \int_{x_2}^{1} P_1^3[x]dx - sx = \frac{x_1}{1+H} + \frac{\delta}{2} + \frac{1-x_2}{1+K} - sx_1 \tag{5}$$

Given model assumptions s is a parameter which defines, in the context of figure 1, the rectangle of ethical costs. To analyze the best location reply (BLR) of firm 1, given the location of firm 2, we evaluate the following derivative:

$$\frac{\partial \pi_1}{\partial x_1} = \frac{\mu(K-H) + 2f(1-x_1-x_2)}{2\mu(1+K)(1+H)} - s = 0 \tag{6}$$

and, symmetrically, for the BLR of firm 2 relative to firm 1

$$\frac{\partial \pi_2}{\partial x_2} = \frac{\mu(H-K) + 2f(1-x_1-x_2)}{2\mu(1+K)(1+H)} - s = 0 \tag{7}$$

Since the two functions are symmetric, they intersect on the line $x_1 = x_2$. Thus, it is easy to show that the Nash equilibrium of the game is given by the following location on the ethical segment:

$$x = \frac{1}{2} - \frac{2\mu s}{f}.\square \tag{8}$$

Remark: It is quite evident that the best location of both firms is smaller than in the standard case without SR (De Palma et al., 1985), where they locate in $\frac{1}{2}$. The two duopolists find their Nash equilibrium by choosing the same location, but they feel the effects of the SR costs and consequently are located more to the left with respect to the standard case.

The deviation of the optimal location from the medium point of the segment in the agglomerated Nash equilibrium depends on the degree of uncertainty on consumers ethical tastes μ and on the corporate cost of SR defined by s. The effect of these two variables on the rightward deviation is reduced in proportion to the psychological consumers cost of ethical distance f. With s=0 we revert to the equilibrium of De Palma et al. (1985).

3 Conclusions

Our model explains the growing relevance of CSR by showing that, in a product differentiation model, even when CSR is modelled as a pure cost, profit maximising duopolists find it optimal to introduce CSR in proportion to the

degree of consumers ethical concerns. We also show the CSR differentiation models differ from standard ones as producer's rightward moves on the segment are costly. We finally show that this peculiarity of the CSR horizontal differentiation model leads to Agglomerated Nash Location Equilibria which do not coincide with those of standard differentiation models in presence of uncertainty on consumer tastes.

4 References

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