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Abstract

This paper investigates firms owners' incentives to engage in Corporate Social Responsibility (CSR) activities in an oligopolistic market, in a strategic delegation and vertical product differentiation context. Firms' owners have the opportunity to hire "socially responsible" managers and delegate to them CSR effort and market competition decisions. In equilibrium, both owners employ socially responsible managers. The strategic behavior of owners to hire socially responsible managers increases both output and profits. The societal consequences of Corporate Social Responsibility are also evaluated.

JEL classification: L15; L22; M14.

Keywords: Oligopoly; Vertical Product Differentiation; Corporate Social Responsibility; Strategic Managerial Delegation.

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1 Introduction

This paper has been motivated by the ongoing debate about the market and welfare implications of Corporate Social Responsibility (CSR hereafter), that is, "a concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on voluntary basis" (European Commission, 2001). This discussion was initiated by the rapid growth of firms like 'The Body Shop', whose products are strongly connected to social and ecological considerations. This is a well documented case of a CSR oriented company (Klein, 1999).[1]

The aforementioned stylized facts reveal that private firms make considerable efforts to become, or at least to appear as, socially responsible.[2] Given this evidence, the question that arises is the following: "Why would the owner(s) of a private firm be willing to engage in activities that promote social values?". The present paper addresses and formalizes this question in an oligopolistic market for a final good, where CSR effort and market decisions are delegated from owners to "socially responsible"(SR hereforth) managers, while consumers differ with respect to their valuation towards CSR activities.

The basic idea behind our model is that firms strategically engage in CSR activities in order to create a "socially friendly image" for their product. We consider that consumers are homogeneous regarding the physical characteristics of the goods, but heterogeneous towards the valuation of the CSR aspects of each product. More socially conscious consumers have higher valuation for the product of the firm that engages in CSR activities, hence, they are

[1] Other well documented examples are corporations such as "Nike" and "Motorola", which not only spend large amounts of money on CSR activities, but they also promote their socially responsible actions through frequent press releases. More specifically "Nike" puts emphasis upon the improvement of working conditions in its facilities in Asia and Mexico, especially after the reactions of many NGO's on this issue. See the "Nike Corporate Responsibility Report", at: www.nike.com/FY04_Nike_CR_report_pt1.pdf (Date last visited: January, 25th 2007). In a similar vein, "Motorola" attempts to create an environmental concerned image, by financing recycling programs. See the "Motorola Global Corporate Citizenship Report", at: www.motorola.com/EHS/safety/reports/2000report.pdf (Date last visited: December, 15th 2006).

[2] More than half of the top 100 corporations in the 16 more industrialized countries published a CSR report in the year 2005 (Becchetti et al., 2006).

willing to pay a higher price for the "socially friendly" good.[3] This is the rational why some consumers show strong preference for "The Body Shop" products, even though these products are more expensive than other conventional cosmetics. On the other hand, engaging in CSR activities includes costly actions by the firm in order to operate in the interests of other stakeholders such as its employees (by improving working and safety conditions related to the production process), the broader community (by ordering more expensive inputs from local suppliers, by financing local cultural events and by contributing to charities) and the environment (by introducing "green" technologies or by financing recycling programs).[4]

Our envisaged duopolistic market follows Häckner (2000) along with Garella and Petrakis (2005), using a utility function that combines horizontal and vertical differentiation aspects of firms' products. The vertical differentiation represents the CSR aspects of the production process that are perceived as quality improvement of the final product by socially conscious consumers. In this context, firms' owners have two alternative strategies: either to delegate market competition decisions to a "SR" manager, or not. This reflects a common practice in the real business world, that is employing a manager with a strong background in CSR activities to undertake not only the CSR activities of the firm but also an active role in the overall decision making of the firm.[5] Delegation of authority from owners to "SR" managers is obviously a signal about the CSR activity policy that the firm is intended to follow, which is, to a large extent, credible to the consumers. Hence it will increase consumers' valuation for their firm's product.

[3] Becchetti et al. (2005) quote the "2003 Corporate Social Responsibility Survey". The main finding of this survey is that the amount of consumers that are socially concerned on their purchasing choices was 62% in 2001 in Europe.

[4] See for example Mayer (1999) and Bris & Brisley (2006).

[5] For instance, in large corporations such as "Vodafone" or "Hewlett-Packard", the announcement of hiring a socially responsible manager is accompanied with detailed report on his/hers previous SR activities and active position in the overall decision making within the firm (Visit: http://www.vodafone.com/section_article/0,3035,CATEGORY_ID%253D30401%2526LANGUAGE_ID%253D0%2526CONTENT_ID%253D265256,00.html and http://www.hp.com/hpinfo/globalcitizenship/gcreport/intro.html (date last visited: December 12th 2006).

The idea of firms' owners employing managers with different objectives than strict profit-maximization, in order to achieve competitive advantage against their rivals, has been formalized in the theory of *strategic managerial delegation*.[6] Following Miller and Pazgal (2001; 2002; 2005) we further consider that managers have a range of different stances towards CSR and this is captured by their "type". Each manager tries to maximize his utility which is the sum of his firm's profits plus the additional utility of engaging in CSR activities. Our main point is that each manager is committed to his own type, and by employing him, firm's owners do commit to CSR of that type also. Therefore, delegation may be strategically used by a strict profit-maximizing owner so as to strengthen his firm's competitive position in the market.

We examine two candidate equilibrium configurations. The first is *Universal CSR* in which both firms' owners employ a SR manager (thus they engage in CSR activities) and the second is the *Asymmetric case* where only one owner hires a SR manager, while his rival does not hire a manager and thus does not undertake any CSR activities. Our main finding is that in equilibrium, each firm's owner employs a SR manager, because by doing so he has the opportunity to increase his profits by obtaining competitive advantage. This interaction causes owners to strategically hire managers who undertake CSR activities.

Thus, Universal CSR is the only endogenously emerging equilibrium. Any unilateral deviation from the Universal CSR configuration, would result the deviant firm to earn lower profits than those earned previously, since in equilibrium output and profits under CSR activities are always higher compared to the benchmark case without CSR efforts. With respect to the societal effects of CSR activities, the strategic behavior of owners to hire SR managers increases consumers' surplus and total welfare too.[7]

[6] Vickers (1985), Fershtman and Judd (1987) and Sklivas (1987) investigate the effects of distorting managerial preferences away from strict profit-maximization towards including consideration of sales. More recently, Miller and Pazgal (2001; 2002; 2005) formalize the idea that in oligopolistic markets a firm's owner may increase his firm's profitability by hiring a manager who, besides his own firm's profits is also concerned with the rival firms' profits when he competes in the market.

[7] Note that the results in our model do not change qualitatively when only CSR effort

Our findings contribute to the existing literature on "strategic CSR", a term that was introduced by Baron (2001) and refers to the case where firms are assumed to be socially responsible because they anticipate a benefit from such a behavior. Baron (2001, 2003) examines CSR under the prism of the strategic choice between public and private politics. His main finding is that private politics and CSR affect the strategic position of a firm in an industry under the existence of activist consumers, who can boycott firms with non-socially friendly behavior. In the same vein, Calveras et al. (2006), assuming a perfectly competitive supply of inputs, compare the effects of formal regulation to firms incentives to provide socially friendly goods as a response to increased activism on behalf of consumers. They argue that substituting formal regulation with firms CSR actions may cause an inefficiency, in which non activist consumers free-ride the willingness to pay of activist consumers, lowering formal regulation.

McWilliams and Siegel (2001) model firms' incentives to engage in CSR activities in oligopolistic markets with homogeneous goods. In the context of the Resource Based View of the firm, managers contact cost-benefit analyses to determine the level of firms' resources that should be allocated to CSR activities. They argue that firms undertaking CSR activities will earn profits equal to those earned by their strictly profit-maximizing rivals.[8] Bagnoli and Watts (2003) examine the case in which an oligopolistic firm links the provision of a public good (such as CSR activities) to the sale of their private product, in the context of unit demands and homogeneous socially responsible consumers. They find that the provision of CSR by firms is negatively related to the number of the firms in the market and positively related to the consumers' willingness to pay for the supply of the public good.[9] The present paper, focuses on the strategic interactions that arise between oligopolistic firms engaging in CSR activities by assuming heterogeneous consumers to-

decisions are delegated to socially responsible managers, while market competition decisions are taken by owners. However as mentioned above, this is not the case in the real business world where socially responsible managers do have an active role in the overall decision making of firms.

[8] McWilliams and Siegel (2001) refer to this outcome as the "Neutrality Result".

[9] See Viviani (2006) and McWilliams and Siegel (2006) for a survey on the subject.

wards CSR and individual consumers can buy in variable quantities from both brands.

The rest of the paper is organized as follows. The next section introduces the model. In section 3 we investigate owners' incentives to hire a SR manager, while in section 4 we conduct welfare analysis. Finally, section 5 concludes.

2 The Model

We consider a market that consists of two firms, denoted by $i, j = 1, 2, i \neq j$, each producing one brand of a differentiated good. On the demand side, there is a *unit mass* of consumers composed by individuals who have identical preferences regarding the physical characteristics of the goods. They are, however, heterogeneous regarding their valuation of the CSR activities that are undertaken by the firm that produces the good. In particular, following Häckner (2000), the utility function of the θ-type consumer is given by:

$$U = (a+\theta s_i)x_i(\theta)+(a+\theta s_j)x_j(\theta)-[x_i^2(\theta)+x_j^2(\theta)+2\gamma x_i(\theta)x_j(\theta)]/2+m \quad (1)$$

where $x_i(\theta)$, $i = 1, 2$, represents the quantity of good i bought by the consumer of type θ and m is the respective quantity of the "composite good". The parameter $\gamma \in [0, 1]$ is a measure of the degree of substitutability among goods, with $\gamma = 0$ corresponding to the case of independent goods and $\gamma = 1$ to that of homogeneous goods. Further, $s_i \geq 0$ represents the CSR effort that firm i undertakes which, in turn, increases θ-type consumer's valuation for its good by θs_i. In other words, θ represents the increase of θ-type consumer's willingness to pay for the firm i's good per unit of CSR effort undertaken by firm i. Thus, the more socially conscious a consumer is, the higher is its θ. While a consumer who does not value the firms' CSR activities at all is of type $\theta = 0$. We assume that θ is distributed according to a cumulative distribution function $F(\theta)$, with density function $f(\theta)$, where $\theta \in [0, 1]$. Thus, $\bar{\theta} = \int_0^1 f(\theta)d\theta$ represents the average type of consumer in the population.

Maximization of utility (1) with respect to $x_i(\theta)$ and $x_j(\theta)$ gives the (inverse) demand functions for the θ-type consumer:

$$p_i = a + \theta s_i - x_i(\theta) - \gamma x_j(\theta), \quad i = 1, 2 \tag{2}$$

where p_i and p_j are the firms' unit prices, while the price of the composite good has been normalized to unity. By inverting (2) we obtain the θ-type consumer's demand for good i:

$$x_i(\theta) = \frac{a(1-\gamma) + \theta(s_i - \gamma s_j) - p_i + \gamma p_j}{1-\gamma^2} \tag{3}$$

By integrating (3) with respect to θ, we get firm i's aggregate demand function:

$$q_i(p_i, p_j) = \int_0^1 x_i(\theta) f(\theta) d\theta = \frac{a(1-\gamma) + \bar{\theta}(s_i - \gamma s_j) - p_i + \gamma p_j}{1-\gamma^2} \tag{4}$$

Finally, by inverting (4), we obtain the firm i's (inverse) aggregate demand function:

$$p_i(q_i, q_j) = a + \bar{\theta} s_i - q_i - \gamma q_j, \ i = 1, 2, i \neq j \tag{5}$$

Observe that the aggregate demand function corresponds to the demand function of an average type consumer, $\bar{\theta}$.

We assume that both firms are endowed with identical constant returns to scale production technologies. Firm i's total cost function is given by $C_i(q_i, s_i) = c(1+s_i^2)q_i$. This implies that, for a given CSR effort s_i, the firm i's marginal (and average) production cost is constant and equal to $c(1+s_i^2)$. Yet, a higher CSR effort increases, at an increasing rate, firm i's unit production costs. This can be justified on the grounds that an individual firm's level of CSR activities, such as improving working conditions for employees, buying more expensive inputs from local suppliers, financing recycling and other SR campaigns, introducing "green" technologies, has an increasingly negative impact on the firm's unit production costs.

Firm i's profits can then be expressed as:

$$\Pi_i = (a + \bar{\theta} s_i - q_i - \gamma q_j) q_i - c(1 + s_i^2) q_i \tag{6}$$

Therefore, CSR activities by firm i lead to higher consumers' valuation for its product and thus to higher aggregate demand for the firm, but, at the same time, they increase firm i's unit and total production costs. Note however that firms' CSR efforts may not be observable, and even in case they are observable, they are not verifiable in the court. Hence, there is a "lemons' problem" in our setup. Once consumers have been convinced that firm i has undertaken a CSR effort s_i, and have thus increased their willingness to pay for the firm's good, the firm has no incentives to spend on CSR activities as these are costly for the firm. Consumers realize the firm's incentives and thus rationally believe that there will be zero CSR activity. The firm, in turn, spends zero on CSR activities in equilibrium.

To solve for the ensuing lemons problem, we evoke the literature on the internal organization of the firm, after paying attention to the widespread real world practices that reveal that large corporations often hire socially responsible managers to do their business. In fact, in large corporations, such as "Vodafone" or "Hewlett-Packard", the announcement of hiring a socially responsible manager is accompanied with detailed report on his/hers previous SR activities. These announcements are obviously signals about the CSR activity policy that the firm is intended to follow, which are, to a large extent, credible to the consumers.

We thus assume that each firm has an owner and a manager. The "owner", which could be the actual owner, the board of directors, or a chief executive officer, has an objective to maximize the firm's profits. On the other hand, the "manager" refers to an agent that the owner hires to make real time operating decisions, and could maximize profits or act according to a personal objective function (see e.g. Fershtman and Judd, 1987). We assume that the owner of firm i has the option to hire a specific CSR-type manager (as reflected on his curriculum of past SR activities) and delegate

to him CSR activities as well as market competition decisions.[10] Potential managers take on a continuum of attitudes towards CSR activities that are captured by their type and by hiring them, profit-maximizing owners are committed to a certain behavior towards CSR. In particular, a manager of type τ_i, $\tau_i > 0$, has a utility function of the form:

$$M_i(\tau_i) = \Pi_i + \tau_i \frac{s_i^2}{2} q_i \tag{7}$$

That is, a τ_i-type manager derives utility not only from the firm i's profits but also from its own CSR activities within the firm. Following Benabou and Tirole (2006) and Calveras et al. (2006), this additional utility has its source to intrinsic and reputational incentives of individual agents. Note that the additional personal utility of the manager is increasing, at an increasing rate, in the level of CSR activities per unit of quantity produced by the firm. This reflects the fact that the additional personal satisfaction of the manager for a unit increase in the firm's CSR activities is higher, the higher is the level of the current level of the CSR activity. Clearly, when the firm's CSR activity is almost null, a small increase of this activity does not contribute much to the manager's personal welfare. Moreover, hiring a manager who is not socially responsible ($\tau_i = 0$) makes no sense, since a firm's owner is unable to solve the ensuing lemons problem in this way. A firm i's owner, however, has the option not to hire any manager, in which case the level of its CSR activity is optimally set to zero, $s_i = 0$. Finally, we assume that owners offer to their (risk neutral) managers "take it or leave it" incentive contracts, which however cannot touch upon the additional personal utility that the managers obtain from the CSR activities. This implies that the owner asks from the manager a franchise fee equal to Π_i and makes the manager "residual claimant" of the net revenues of the firm's operations.[11]

[10] This is in line with Miller and Pazgal (2001, 2002, 2005) where the authors suggest that a firm's owner chooses a manager whose attitude fits to his own competitive goals.

[11] Although in real life the terms of managerial contracts can be determined via owners-managers negotiations, it is a regular assumption in the strategic delegation literature that the market for managers is perfectly competitive and the owners have all the power during negotiations, i.e., they offer to their managers "take it or leave it" incentive contracts (see Vickers, 1985; Fershtman and Judd, 1987; and Sklivas, 1987). In our model the market for

We consider a three-stage game with observable actions. The timing of the game is as follows. In the first stage, both firms' owners, simultaneously and independently, decide whether they will hire a manager, and if so, the specific type of the manager that they will hire.[12] In the second stage, managers decide on the level of the firms' CSR activities. In case that an owner has chosen not to hire a manager, he does not undertake any CSR activity. Finally, in the third stage, managers, or in their absence owners, compete by setting their quantities in the market. We solve the game by applying subgame perfection.

3 Equilibrium incentives for CSR

3.1 The symmetric case: Universal CSR

We begin our analysis assuming that both firms' owners choose to delegate CSR and output decisions to socially responsible managers. We may then ask whether this is an equilibrium configuration. If no owner has an incentive to deviate towards pure profit-maximization (i.e. not to hire a manager), *Universal CSR* is an equilibrium configuration. Equivalently, Universal CSR will endogenously emerge in the subgame perfect equilibrium.

Under the above candidate equilibrium, in the first stage of the game, both owners simultaneously and non-cooperatively hire SR managers, i.e., managers characterized by $\tau_i > 0$, $i = 1, 2$. Then, CSR effort decisions are

managers is not necessarily perfectly competitive, because each manager is characterized by a unique curriculum with its previous SR activity (in line with Miller and Pazgal, 2001, 2002, 2005). It could be thus reasonable to assume that the manager gets either a fixed salary or a share of the firm's profits (besides its personal satisfaction). A compensation in the form of a fixed salary will not alter our results (provided that it is not too high). However, if the compensation is on the form of a share of the firm's profits, the results will be sensitive to the distribution of power between the owner and the manager.

[12] This assumption is essential in order for delegation to have strategic value. Katz (1991) argues that unobservable contracts have no commitment value at all. Fershtman and Judd (1987) support that even if contracts are not observable, they will become common knowledge when the game is being repeated for several periods. More recently, Kockesen and Ok (2004) argue that to the extent that renegotiation is costly and/or limited, in a general class of economic settings, strategic aspects of delegation may play an important role in contract design, even if the contracts are completely unobservable.

taken simultaneously and independently by managers, while in the last stage managers engage in quantity competition. Thus, manager i sets q_i so as to maximize his utility given by eq.(7), taking as given the type of his rival manager, τ_j, along with the CSR effort, s_j, and the output level, q_j, that the latter sets.

The first order condition (foc) of eq.(7) leads to the manager i's reaction function:

$$q_i^{CSR}(q_j^{CSR}) = \frac{a - c - \gamma q_j}{2} + \frac{2\bar{\theta}s_i - s_i^2(2c - \tau_i)}{4} \tag{8}$$

Note that, by comparing eq.(8) to the benchmark case without CSR activities where only the first term of the RHS of eq.(8) appears,[13] CSR effort has two opposing effects on manager i's decision over the output level. On the one hand, CSR effort increases firm i's level of production and thus, equilibrium output. On the other hand, CSR effort increases unit cost, decreasing equilibrium output. Thus, if $s_i < 2\bar{\theta}/(2c - \tau_i)$, $c > \tau_i/2$ then the dominant effect is the first, while the opposite holds for $s_i > 2\bar{\theta}/(2c - \tau_i)$.[14]

By solving the system of the above focs we obtain the equilibrium output of the third stage:

$$q_i^{CSR} = \frac{2a(2-\gamma) - 2c[2(1+s_i^2) - \gamma(1+s_j^2)] + 2s_i(2\bar{\theta} + s_i\tau_i) - \gamma s_j(2\bar{\theta} + s_j\tau_j)}{2(4-\gamma^2)} \tag{9}$$

In the second stage of the game, manager i sets s_i so as to maximize his utility given by:

[13] As a benchmark, the case where both owners employ non-socially concerned managers is considered ($\tau_i = \tau_j = 0$). This case corresponds to the standard Cournot competition with $s_i = \tau_i = 0$, where the reaction function is given by: $q_i^C(q_j^C) = (a - c - \gamma q_j^C)/2$, while equilibrium output, price, profits and total welfare are $q_i^{C^*} = (a-c)/(2+\gamma)$, $p_i^{C^*} = [a+(1+\gamma)c]/(2+\gamma)$, $\Pi_i^{C^*} = (q_i^{C^*})^2$ and $TW^{C^*} = Q^2(3+\gamma)/4$, where $Q = q_i + q_j = 2q$ respectively.

[14] It must be noticed that in equilibrium, the inequality $c > \tau_i^{CSR^*}/2$ always holds.

$$M_i^{CSR} = \frac{\{2a(2-\gamma) - 2c[2(1+s_i^2) - \gamma(1+s_j^2)] + 2s_i(2\bar{\theta} + s_i\tau_i) - \gamma s_j(2\bar{\theta} + s_j\tau_j)\}^2}{4(4-\gamma^2)^2} \tag{10}$$

Taking the first order conditions and solving the system of equations, we obtain the equilibrium CSR effort of the second stage:

$$s_i^{CSR} = \frac{\bar{\theta}}{2c - \tau_i} \tag{11}$$

From eq.(11) one observes that each SR manager will optimally set the amount of CSR effort that allows him to increase output, compared to the case where output level is chosen by profit-maximizing owners, that is $s_i^{CSR} < 2\bar{\theta}/(2c - \tau_i)$. The intuition behind this result goes as follows: manager i's objective function is consisted by firm i's profits plus the additional utility of engaging in CSR activities. Hence, manager i, by increasing CSR effort up to a level where output is also increased, firstly, his additional utility increases and secondly, he has the opportunity to gain competitive advantage for his firm and increase its profits.

In the first stage of the game, owner i chooses the type τ_i^{CSR} of manager that will hire in order to maximize his profits given by:[15]

$$\Pi_i^{CSR}(\tau_i^{CSR}, \tau_j^{CSR}) \tag{12}$$

By imposing symmetry, solving the foc and rearranging we obtain a unique solution for the type of the manager that will be hired in equilibrium:

$$\tau^{CSR^*} = \tau_i^{CSR^*} = \tau_j^{CSR^*} = \frac{32c(a-c) + \bar{\theta}^2(12 + 2\gamma - \gamma^2) - B}{a(a-c)(8-\gamma^2)} > 0 \tag{13}$$

Where:
$B = \sqrt{[32c(a-c) + \bar{\theta}^2(12 + 2\gamma - \gamma^2)]^2 - 16\gamma^2 c(8-\gamma^2)(a-c)[4c(a-c) + \bar{\theta}^2]}$.

[15] Due to space limits some algebraic formulas are not presented. These are available from the authors upon request.

Observe from eq.(13) that, in equilibrium, since $\tau^{CSR^*} > 0$, both firms' owners do hire socially responsible managers. The intuition behind this result goes as follows: each owner, when choosing to hire an SR manager (who sets output at a level higher than that set under $\tau_i = 0$, since this increases his utility), has an opportunity to obtain competitive advantage in the market, against the competing firm, provided that the rival owner does not hire a SR manager. In equilibrium, both owners act in the same way.

Plugging τ^{CSR^*}in eq.(12), (11), (9), (4) and (6) one obtains equilibrium values for CSR effort, output, price and profits, given by: s^{CSR^*}, q^{CSR^*}, p^{CSR^*} and Π^{CSR^*} respectively.

$$s^{CSR^*} = \frac{4\bar{\theta}(a-c)(8-\gamma^2)}{\bar{\theta}^2\{8c(a-c)(4-\gamma^2) - \bar{\theta}^2[12+\gamma(2-\gamma)] + B\}} \tag{14}$$

$$q^{CSR^*} = \frac{(a-c)\{8c(a-c)(4-\gamma^2) - \bar{\theta}^2[4-\gamma(2+\gamma)] + B\}}{(2+\gamma)\{8c(a-c)(4-\gamma^2) - \bar{\theta}^2[12+\gamma(2-\gamma)] + B\}} \tag{15}$$

$$p^{CSR^*} = \frac{8c\{3c[8-(6-\gamma-\gamma^2)] - a\gamma(2-\gamma-\gamma^2)\} + (3+\gamma)\{\bar{\theta}^2[12+\gamma(2-\gamma)] + \Gamma\}}{16c(3-\gamma)(2+\gamma)^2} \tag{16}$$

Where:

$$\Gamma = \sqrt{16[8c(a-c)+3\bar{\theta}^2]^2 + 16\gamma\bar{\theta}^2[8c(a-c)+3\bar{\theta}^2] - 4\gamma^2[128c^2(a-c)^2 + 48c\bar{\theta}^2(a-c) + 5\bar{\theta}^4] - \gamma^4[8c(a-c)+\bar{\theta}^2]^2}$$

By comparing the equilibrium output, price and profits under universal CSR, with the corresponding under the benchmark case without CSR activities (standard Cournot competition), we find that $q^{CSR^*} > q_i^{C^*}$ always holds, since a SR manager will always set $s_i^{CSR} < 2\bar{\theta}/(2c - \tau_i)$. Hence, in equilibrium, the manager will set output at a level higher than that set under a strict profit-maximizing behavior. Moreover $p^{CSR^*} > p_i^{C^*}$, since increased valuation for the CSR aspects of the product by consumers leads to higher prices. Moreover, $\Pi^{CSR^*} > \Pi_i^{C^*}$ always holds. Intuitively, firms' profits are affected by two opposite effects: according to the first one, since CSR activities are evaluated by consumers positively, these activities increase demand and profits for the CSR related products. On the contrary, increased equilib-

rium output along with increased unit cost by both competing firms, tends to decrease equilibrium profits. Results in equilibrium reveal that it is the second effect that dominates. The following lemma summarizes:

Lemma 1: *Equilibrium output, prices and profits under Universal CSR are always higher comparing to the benchmark case without CSR activities.*

Universal CSR is an equilibrium configuration only if no owner has incentives to unilaterally deviate by not hiring a manager. Suppose for instance that owner 1 decides to delegate output decisions to a SR manager, believing that owner 2 will do the same. Given that there is no credible commitment on the selection of managers, owner 2 decides to deviate towards not hiring a manager. The deviation game unravels as follows:

In the first stage of the game owner 1 hires a manager of type $\tau_1^{CSR^*}$ that corresponds to the Universal CSR case. On the other hand, owner 2 will choose not to hire a manager (or equivalently, he will choose $\tau_2^d = 0$) and thus sets $s_2^d = 0$. Thus, plugging $\tau_2^d = s_2^d = 0$ in eq.(11) and (12) we obtain the deviant's profits: Π_2^d.

By comparing the deviation profits Π_2^d with the profits in the Universal CSR configuration, Π^{CSR^*}, we find that $\Pi^{CSR^*} > \Pi_2^d$ always holds. Therefore, firm 2's owner does not have incentives to deviate from the Universal CSR towards a strict profit-maximizing behavior. The following proposition summarizes:

Proposition 1: *Universal CSR is an endogenously emerging equilibrium configuration.*

The intuition behind this result goes as follows. Since each owner responds optimally to the choice of the competing firm's owner, any deviation to a different behavior, such as strict profit-maximization, would result the deviant firm to earn less profits than its previous case, since under this scenario the competitor will obtain competitive advantage in the market. By doing so, each owner strategically uses the SR characteristics of his manager and obtains leadership in the market, accompanied by comparatively higher

profits. Note also that the case where both owners do not hire managers is not an equilibrium, since the optimal response of an owner against a pure profit-maximizing owner is to hire a manager who is SR, because the latter is more aggressive during the output competition stage of the game.

3.2 The Asymmetric case

We next propose as a candidate equilibrium configuration the *Asymmetric* one where owner i chooses to hire an SR manager to compete in the market, while owner j chooses to act by himself, i.e. as a profit-maximizing agent who will not undertake any CSR activities. This is equivalent to choosing a manager of type $\tau_j^{pm} = 0$ and also setting $s_j^{pm} = 0$. Under the present candidate equilibrium, in the last stage of the game, manager $i(j)$ chooses $q_i(q_j)$ in order to maximize his utility given by eq.(7). The corresponding reaction curves for manager i and j are given by:

$$q_i^{csr}(q_j^{pm}) = \frac{a - c - \gamma q_j^{pm}}{2} + \frac{2\bar{\theta} s_i^{csr} - s_i^{csr^2}(2c - \tau_i^{csr})}{4} \tag{17}$$

$$q_j^{pm}(q_i^{csr}) = \frac{a - c - \gamma q_i^{csr}}{2} \tag{18}$$

Solving the system of the above foc, equilibrium output in the second stage is given by:

$$q_i^{csr}(\tau_i^{csr}, \tau_j^{pm} = 0, s_i^{csr}, s_j^{pm} = 0) = \frac{(a - c)(2 - \gamma) + 2\bar{\theta} s_i^{csr} - s_i^{csr^2}(2c - \tau_i^{csr})}{4 - \gamma^2} \tag{19}$$

$$q_j^{pm}(\tau_i^{csr}, 0, s_i^{csr}, 0) = \frac{2(a - c)(2 - \gamma) - 2\gamma\bar{\theta} s_i^{csr} + \gamma s_i^{csr^2}(2c - \tau_i^{csr})}{2(4 - \gamma^2)} \tag{20}$$

In the second stage of the game, given that manager j will undertake no CSR effort, manager i sets s_i^{csr} by maximizing his utility given by:

$$M_i^{csr}(\tau_i^{csr}, 0, s_i^{csr}, 0) = \frac{[(a-c)(2-\gamma) + 2\bar{\theta}s_i^{csr} - s_i^{csr^2}(2c - \tau_i^{csr})]^2}{(4-\gamma^2)^2} \quad (21)$$

Solving the foc of eq.(21), one obtains a unique solution of the CSR effort undertaken by manager i:

$$s_i^{csr} = \frac{\bar{\theta}}{2c - \tau_i} \quad (22)$$

We now restrict our attention to the first stage of the game. Given the decision of owner j to stick to profit-maximization, owner i chooses to hire a manager of type τ_i^{csr} so as to maximize profits given by $\Pi_i^{csr}(\tau_i^{csr}, 0)$.

Solving the foc one obtains a unique solution for the type of the manager that owner i will hire in equilibrium:

$$\tau_i^{csr^*} = \frac{8c(a-c)(2-\gamma) + \bar{\theta}^2(6-\gamma^2) - \frac{1}{2}\Xi}{(a-c)(2-\gamma)(8-\gamma^2)} > 0 \quad (23)$$

Where:

$\Xi = \sqrt{4[8c(a-c)(2-\gamma) + \bar{\theta}^2(6-\gamma^2)]^2 - 8c\gamma^2(a-c)(2-\gamma)(8-\gamma^2)[2c(a-c)(2-\gamma) + \bar{\theta}^2]}$

Plugging $\tau_i^{csr^*}$ in eq.(22), (19), (20) and (6) we obtain firms' equilibrium CSR effort, output, prices and profits denoted by: $s_i^{csr^*}, q_i^{csr^*}, q_j^{pm^*}, p_i^{csr^*}, p_j^{pm^*}, \Pi_i^{csr^*}$ and $\Pi_j^{pm^*}$, respectively.

By comparing the equilibrium output, prices and profits under the Asymmetric case with the corresponding under the benchmark case without CSR activities, we find that $q_i^{csr^*} > q_j^{pm^*}, q_i^{csr^*} > q_i^{C^*}$, $p_i^{csr^*} > p_j^{pm^*}, p_i^{csr^*} > p_i^{C^*}$ and $\Pi_i^{csr^*} > \Pi_j^{pm^*}, \Pi_i^{csr^*} > \Pi_i^{C^*}$ always hold. Thus, we state the following lemma:

Lemma 2: *In the Asymmetric case, the firm that engages in CSR activities produces higher output, charges higher price and earns higher profits compared to its profit-maximizing competitor and the Benchmark case without CSR activities.*

The intuition behind these results is that a SR manager will produce output at a level higher than that produced under strict profit-maximization.

Thus, in the Asymmetric case, the owner that delegates market competition decisions to such a manager, obtains competitive advantage in the market. In addition to that, positive CSR effort will increase the demand and the price for his firm's product. These three effects increase profits, compared to the rival firm and the benchmark case. Conversely, the strictly profit-maximizing manager produces output at a level lower than that produced by the SR manager, and the absence of CSR effort decrease the demand and the price for his firm's product, which affects negatively the former's firm profitability.

In order to examine if the Asymmetric configuration is an equilibrium one, one has to check two possible deviations. Firstly, owner 2 may deviate from strict profit-maximization towards selecting an SR manager. Secondly, owner 1 may deviate and hire a profit-maximizing manager. If one owner is found to have incentives to deviate from his candidate equilibrium strategy, then the Asymmetric configuration is not a subgame perfect equilibrium. Therefore we will not have to check for any other possible deviations.

We begin our analysis with the first case of deviation. In the first stage, owner 1 hires an SR manager ($\tau_1^{csr^*} > 0$), believing that owner 2 will stick to profit-maximization. Owner 2 decides to deviate and also hire an SR manager of type $\tau_2^d(\tau_1^{csr^*}) > 0$. Thus, plugging $\tau_1^{csr^*}$ in eq.(12) the following expression results:

$$\Pi_2^d(\tau_1^{csr*}, \tau_2) \tag{24}$$

Maximizing with respect to τ_2, solving and rearranging, one obtains the deviant's optimal type of manager, $\tau_2^d > 0$. Substituting τ_2^d in eq.(24) the deviant owner's profits are given by: Π_2^d.

By comparing the deviation profits Π_2^d with the profits that result in the candidate equilibrium (Asymmetric case), we find that $\Pi_j^{pm^*} < \Pi_2^d$ always holds. Therefore, firm 2's owner has always incentives to deviate from a strict profit-maximizing behavior towards hiring an SR manager. The following proposition summarizes:

Proposition 2: *The Asymmetric case is not an endogenously emerging equi-*

librium configuration.

The intuition behind this result is along the lines of the equilibrium analysis given in Proposition 1 and thus, we omit it since it reproduces the arguments stated there.

4 Welfare analysis

In this part of the paper we investigate the social effects of hiring SR managers, i.e. we undertake a welfare analysis. Total welfare is defined as:

$$TW^A = CS^A_{net} + \Pi^A,\ A = CSR^*, C^* \tag{25}$$

with Π^A and CS^A_{net} being the overall market profits and net consumers' surplus respectively.[16]

More specifically, the net consumer surplus of a θ-type consumer is given by the following expression:

$$CS(\theta) = (a + \theta s_i)x_i(\theta) + (a + \theta s_j)x_j(\theta) - [x_i^2(\theta) + x_j^2(\theta) + 2\gamma x_i(\theta)x_j(\theta)]/2 - \Phi \tag{26}$$

Where: $\Phi = p_i x_i(\theta) + p_j x_j(\theta)$.

In equilibrium, due to symmetry we have $s_i^* = s_j^* = s^{CSR^*}$and $p_i^* = p_j^* = p^{CSR^*}$. Hence, after some manipulations, eq.(26) and (3) become:

$$CS(\theta) = (1 + \gamma)[x^*(\theta)]^2 \tag{27}$$

$$x^*(\theta) = \frac{a + \theta s^{CSR^*} - p^{CSR^*}}{1 + \gamma} \tag{28}$$

In order to obtain analytical solutions for the net consumers' surplus and the total welfare, in this section we assume that θ is uniformly distributed,

[16] The Asymmetric case is not considered in this section, since it never emerges in equilibrium.

i.e. $f(\theta) = 1, \theta \in [0,1]$.[17] Hence, considering eq.(27), the total net consumers' surplus is given by:

$$CS_{net}^{CSR^*} = (1+\gamma)\int_0^1 [x^*(\theta)]^2 d\theta \tag{29}$$

Substituting eq.(28) into (29) and solving gives:

$$CS_{net}^{CSR^*} = \frac{3(a-p^{CSR^*})^2 + 3s^{CSR^*}(a-p^{CSR^*}) + {s^{CSR^*}}^2}{3(1+\gamma)} \tag{30}$$

Plugging eq.(30), (14), (16) and Π^{CSR^*}into (25) one obtains total welfare for the Universal CSR, TW^{CSR^*}. By comparing total welfare under Universal CSR to the one obtained under the benchmark case, TW^{C^*}, one finds that $TW^{CSR^*} > TW^{C^*}$ always. The following Proposition summarizes:

Proposition 3: *Firms owners' strategic choice to engage in CSR activities increases welfare always.*

Let us now proceed to explain how we came to this result. According to Propositions 1 and 2, it has already been clear that in equilibrium, each firm's owner has a dominant strategy to hire a SR manager. This tends to increase output, profits, consumers' surplus and total welfare. On the other hand, hiring SR managers increases unit cost of production, which decreases total welfare. It is found that the positive effect of increased consumers' surplus on total welfare dominates the negative effect of increased costs and thus, $TW^{CSR^*} > TW^{C^*}$always.

5 Concluding remarks

This paper explores firms owners' incentives to engage in Corporate Social Responsibility activities in the context of an oligopoly, introducing strategic managerial delegation and vertical product differentiation. Owners are given

[17]However different destributions of θ may alter the results presented in this section. More specifically, if $\bar{\theta} \to 0$,then CSR activities by both firms may decrease total welfare. Conveserly, if $\bar{\theta} \to 1$, the result that CSR activities increase welfare, is reenforced.

the opportunity to hire a "socially responsible" manager and delegate to him market competition decisions. Each SR manager will try to maximize his utility given by the sum of firm's profits plus the additional utility of SR managers that engage in CSR activities.

We find that in equilibrium both owners' dominant strategy will be to employ a SR manager to compete in the market, because by doing so each owner has the opportunity to obtain competitive advantage against the rival firm. This interaction among competing firms causes equilibrium output and profits to be higher compared with the benchmark case where no CSR activities are undertaken. Our analysis also reveals that CSR activities increase social welfare.

The analysis was carried out for a duopolistic market structure. We believe that the duopolistic market provides all essential insights about the firms' owners' incentives to undertake CSR activities. We are also aware of the limitations of our analysis in assuming specific functional forms. However, it is the nature of the equilibrium conditions that drive our results that allows us to argue that these results will also hold under general demand and cost functions. The use of more general forms would jeopardize the clarity of our findings, without significantly changing their qualitative character. Given the current debate about the market and welfare implications of Corporate Social Responsibility the present paper sheds light on the firms' incentives to engage in CSR activities in oligopolistic markets. We believe that our results could also provide guidelines for future empirical research on the "profitability of CSR schemes" literature and contribute to the so far inconclusive received empirical results (see McWilliams et al., 2006; Siegel and Vitaliano, 2006). A testable hypothesis that emerges from our analysis is that the higher the amounts that firms invest in CSR activities, the higher the mass of socially concerned consumers they attract and subsequently, the higher the firms' profits.

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