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Market equilibrium in the presence of green consumers and responsible firms: A comparative statics analysis☆

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ABSTRACT

This paper analyzes how the interaction between green consumers and responsible firms affects the market equilibrium. The main result is that a higher degree of responsibility of consumers and/or firms may both increase and decrease the total abatement and the social welfare. In general an increment in the degree of CSR of a firm entails an increase of its total clean-up and a reduction of the aggregate abatement of its rival. When the rival firm has a high degree of CSR this second effect is stronger than the first and total abatement falls down. At the same time, when the degree of consciousness of consumers and/or firms is very high, responsible firms overprovide environmental quality: in such case a further increment in the level of social responsibility of a market actor may trigger an increase of firms' total clean-up but a reduction in social welfare.

1. Introduction

In the last two decades a growing body of literature on environmental economics has been devoted to the analysis of the so called third generation instruments for pollution control: the classic *command*

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and control approach can be substituted, or integrated, not only by economic instruments (i.e. taxes, subsidies and tradable permits) but also by the voluntary market choices of environmentally aware agents.[1] However, the current debate is far from a complete understanding of the actual capabilities of both individual and firm responsibility as a mean to effectively promote environmental protection (see Bénabou and Tirole, 2010).

In many sectors firms adopt *labeling schemes* in order to increase their market share. As noted by Kotchen (2005) and Besley and Ghatak (2007), environment-friendly goods can be viewed as impure public goods, in which private and public characteristics are bundled together. As emphasized by Bagnoli and Watts (2003), the form of this bundling can be either explicit or implicit. The former corresponds to situations in which firms improve the production of environmental quality by increasing their marginal costs (e.g. the production of energy from renewable sources rather than from fossil fuels). The latter corresponds to situations in which firms sustain environmental programs whose benefits and costs are not proportional to their sales (e.g. fixed investments directed to build a public park close to the plant).

There is convincing evidence that many consumers are willing to pay a price premium to purchase environment-friendly goods (see Bansal, 2008; Kitzmueller and Shimshack, 2012 for empirical references). A strand of economic literature models the impact of green consumers on the market equilibrium adopting the framework of a vertically differentiated oligopoly. A first group of papers focuses on how the presence of green consumers interacts with the optimal environmental policy (see Arora and Gangopadhyay, 1995; Cremer and Thisse, 1999; Moraga-Gonzalez and Padron-Fumero, 2002; Bansal and Gangopadhyay, 2003; Lombardini-Riipinen, 2005; Bansal, 2008). A second group deals with the impact of a higher consumers' consciousness on the market equilibrium and the associated social welfare (see Eriksson, 2004; Conrad, 2005). In these models, usually the results warn against a naive confidence in consumers' responsibility as a solution to environmental problems. Indeed, rarely the market equilibrium in the presence of green consumers approximates the maximization of social welfare. Moreover, some authors show that a higher level of consumers' responsibility is not always associated to less pollution and higher welfare[2] (Rodriguez-Ibeas, 2007; Garcia-Gallego and Georgantzis, 2009).

Following Garcia-Gallego and Georgantzis (2009), we study a vertically differentiated oligopoly where two firms overcomply the existing environmental regulation by producing two differentiated goods (high vs. low quality), while a competitive fringe produces a good with standard quality. We believe that this framework is more realistic because it allows the analysis of the simultaneous presence of both clean and dirty firms. As far as the production technology is concerned, we assume that costs and benefits of the environmental quality are increasing and convex in the clean-up effort and proportional to the level of production, what usually happens when firms abate the pollution associated to their production process or use a cleaner input: following the terminology of Bagnoli and Watts (2003), we analyze an explicit bundling.[3]

As usual, we assume that consumers have a different willingness to pay (hereafter WTP) for "clean" products and we study how an increase in their aggregate WTP affects the market equilibrium. The main novelty of our paper is that we allow firms to choose their market strategy in accordance with an objective function that may not coincide with profit maximization. Indeed, in some markets, especially when the good traded is an impure public good, we observe competition between firms with different aims. For example in the Fair Trade sector, standard for-profit firms may compete with non-profit firms, whose main objective is the maximization of the positive externality associated to their production (Becchetti and Huybrechts, 2008). At the same time, as happens in the energy sector for many countries,

[1] See Khanna (2001), for a survey on this historical evolution.

[2] Similar conclusions are reached in a different framework by Calveras et al. (2007). They consider a model in which citizens first vote the minimum environmental standard and then buy a good produced in perfectly competitive markets. According to their analysis, a higher level of activism in the society may imply a higher level of pollution.

[3] Many existing models adopt this assumption. See for instance Cremer and Thisse (1999), Eriksson (2004), Lombardini-Riipinen (2005), Conrad (2005), Rodriguez-Ibeas (2007) and Bansal (2008). Following Bansal, (2008, p. 347), we believe that this assumption is empirically more relevant than the alternative and frequently used hypothesis of quality costs independent of the volume of output. However, for the sake of completeness, Doni and Ricchiuti (2011) analyze also the case of fixed costs.