



# An experiment on energy-saving competition with socially responsible consumers: Opening the black box<sup>☆</sup>



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## ARTICLE INFO

### Article history:

Received 6 May 2014

Revised 7 June 2015

Accepted 8 June 2015

Available online 12 June 2015

### JEL:

C91

L11

### Keywords:

Corporate social responsibility

Energy savings

Public good

Oligopoly experiments

Vertical differentiation

Altruism

Environmental certification

## ABSTRACT

We present results from experimental price-setting oligopolies in which green firms undertake different levels of energy-saving investments motivated by public subsidies and demand-side advantages. We find that consumers reveal higher willingness to pay for greener sellers' products. This observation, in conjunction to the fact that greener sellers set higher prices, is compatible with the use and interpretation of energy-saving behaviour as a differentiation strategy. However, sellers do not exploit the resulting advantage through sufficiently high price-cost margins, because they seem trapped into "run to stay still" competition. Regarding the use of public subsidies to energy-saving sellers we uncover an undesirable crowding-out effect of consumers' intrinsic tendency to support green manufacturers. Namely, consumers may be less willing to support a green seller whose energy-saving strategy yields a direct financial benefit. Finally, we disentangle two alternative motivations for consumer's attractions to pro-social firms; first, the self-interested recognition of the firm's contribution to the public and private welfare and, second, the need to compensate a firm for the cost entailed in each pro-social action. Our results show the prevalence of the former over the latter.

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## 1. Introduction

Apart from purely altruistic motivation stemming from a manager's environmental concerns, firms undertake energy-saving investments as part of their corporate social responsibility (CSR) strategies pursuing specific economic benefits.<sup>1</sup> Such benefits may result from a decrease in a firm's variable costs, access to public subsidies towards energy-saving production and demand-side advantages due to the firm's improved image among socially-responsible

consumers.<sup>2</sup> While the above has been noticed by different strands in the literature, the interplay between these effects has not been studied so far, mostly due to the difficulty in isolating them from a plethora of other co-existing factors and phenomena entailed both in the firms' market and non-market strategies and in the consumers' underlying motivations.

Several theoretical and empirical studies reviewed below accept that consumers tend to support sellers with some prosocial activity and that this motivates firms to make socially beneficial investments in an effort to differentiate themselves from other sellers. However, no motivation has been clearly identified as to why consumers would be willing to pay more for products sold by socially responsible firms.

<sup>☆</sup> Financial support by the Spanish Ministry of Science and Innovation, project ECO 2011-23634, is gratefully acknowledged. Comments by an anonymous reviewer have helped us to substantially improve this manuscript.

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<sup>1</sup> Milton Friedman (1970) argued that the responsibility of a corporate executive is to make as much money as possible, conforming to basic rules according to the law and ethical custom. This critical position towards CSR is also apparent in neoclassical economists' recent statements. See, for example, Henderson (2001), Jensen (2002) and Sundaram and Inkpen (2004). Other economists argue that within a context of globalization, nation states and their agencies are severely constrained in their ability to monitor and protect the rights of their citizens and to provide sufficient public goods. See, for example, Beck (2000), Kaul et al. (2003) and Scherer and Palazzo (2007).

<sup>2</sup> Consistent with economic theories of the firm, McWilliams and Siegel (2001) suggest that the economic case is not to accept or reject CSR entirely, but to find an optimum level of CSR. Husted and Salazar (2006) extend these arguments to say that a strategic approach to CSR may help business firms to improve profitability and enhance social performance at the same time. They describe the context in which it may be possible to maximize social profit so that both society and business firms benefit. Distinguishing among strategic CSR, altruistic CSR, and even coerced CSR, McWilliams and Wright (2006) describe a variety of perspectives on CSR, which they use to develop a framework for consideration of the strategic implications of CSR. Baron (2001) defines strategic CSR as the use of CSR to attract socially responsible consumers, in the sense that firms provide a public good in conjunction with their marketing/business strategy.

For example, it has not been clarified whether a consumer supports a prosocial seller because he appreciates the costs incurred during the prosocial activity, or because the activity itself has a direct utility-increasing effect for the consumer. Another policy-relevant question that has been left unanswered is whether a favourable public attitude towards energy-saving strategies through, say, a green supply chain subsidy, could have a crowding-out effect, going against the consumer's appreciation of a seller's CSR. In fact, it is commonly accepted that subsidizing green firms and increasing the consumers' awareness towards environmental issues can both be monotonically beneficial for the society and profitable for green producers.<sup>3</sup> The effect that a subsidy may have on a socially responsible consumer's attitude towards green firms has never been addressed so far.

Focusing on the interpretation of CSR as a product differentiation strategy, we can divide the relevant literature into three different groups. The first group considers ethical consumption as a source of vertical<sup>4</sup> product differentiation assuming that all the consumers prefer buying the product with a CSR characteristic than the product without such a characteristic, although they have different valuations for it. The second group assumes horizontal<sup>5</sup> product differentiation with some of the consumers' ideal varieties being closer to one product than another. The third group<sup>6</sup> is a mix of the two former groups, assuming that consumers' population is split into two different exogenously given groups of consumers with different preferences: the group of convinced standard consumers and the group of potentially ethical consumers. Our framework relates to the first group in which product variants differ in their quality and consumers differ in their willingness to pay for quality, following the pioneering work of Gabszewicz and Thisse (1979), Mussa and Rosen (1978), and Shaked and Sutton (1982, 1983)<sup>7</sup>.

Regarding the profitability of CSR, Reinhardt (1998) finds that a firm engaging in such a strategy can only generate an abnormal return if it can prevent imitation by its competitors. In competitive markets this is unlikely, since CSR is highly transparent. Other theoretical studies (Dutta, Lach and Rustichini, 1995; Hoppe and Lehmann-Grube, 2001) show that any early mover advantages that might be gained by offering higher quality products are eroded when competitive strategies are observable. Our work relates with research on CSR in oligopoly theory and public economics. While some models predict that firms producing a higher quality product earn 'abnormal' returns, these findings hinge on the assumption that costs are constant and independent of quality.<sup>8</sup> However, in the case of energy-saving investments, it is usually the case that they tend to increase a

firm's fixed costs, while decreasing variable costs. Furthermore, some economic models of CSR (Baron, 2001; Feddersen and Gilligan, 2001) identify an important countervailing force on the ability of companies to engage in strategic CSR in oligopolistic industries: activists who target leading firms. This countervailing force makes it difficult for oligopolistic firms to achieve a competitive advantage through the strategic use of CSR. Another related strand in the literature considers CSR as a private contribution to a public good.<sup>9</sup> Bagnoli and Watts (2003) study the feasibility of CSR by private firms with "warm-glow" (in Andreoni's (1989, 1990) sense) preferences for public goods. They conclude that, when firms explicitly link provision of a public good to sales of the private good they offer, the provision of the public good is inversely related to the competitiveness of the market. Specifically related to our framework, they find that if provision of the public good is not explicitly linked to the sales of the private good and there is free entry, too little of the public good is privately provided.<sup>10</sup>

Our paper relates to three experimental papers. First, Cason and Gangadharan (2002) study sellers' incentives to offer products of differing environmental quality. The authors conclude that the regulator can improve environmental performance by providing the option of certified green labelling in a posted offer market with 5 sellers and 6 buyers that lasts for 20 periods. When offered the possibility of selling products certified by a third party at a fixed cost, unknown to buyers, most sellers pay for the certification and endogenously decide to deliver environmentally friendly products, while cheap talk or reputation building are ineffective in increasing market efficiency significantly. A key difference with our framework is that the environmentally superior product has a higher unit cost and benefits only the buyer of that product whereas we consider that every consumer, whether buying or not the ecological varieties, benefits from all producers' investment in cleaner production. Second, Rode, Hogarth and Le Menestrel (2008) study ethical differentiation of products in triopolistic experimental markets where producers set prices for the exogenously determined varieties they sell. The high quality producer's costs were higher than the others. In two treatments, the additional costs were attributed to compliance with ethical guidelines. In the third, no justification was provided. Many consumers reduced their experimental gains by purchasing the ethically differentiated products at higher prices. The extra cost of producing a superior unit was effectively donated to an NGO fighting child labour, having thus a potentially different valuation for every experiment participant, while in our framework the contribution to the social fund is equally shared among all consumers. We revisit the experimental data-set of Barreda et al. (2011), who investigate whether

<sup>3</sup> Endres (1997) proposes the use of state campaigns aimed at awakening people's ecological awareness. However, there are only a few studies focusing on the negative effects that such campaigns may have on the economic and environmental performance of product markets. For example García-Gallego & Georgantzis (2009, 2011) argue that the state cannot rely upon private campaigns aiming at increasing the consumer's ecological awareness, because firms would benefit from increasing consumer heterogeneity by funding campaigns targeting the most environmentally conscious of the consumers. On the contrary, they show that state campaigns should aim at increasing the ecological awareness of the least environmentally conscious consumers.

<sup>4</sup> See Amacher, Koskela and Ollikainen (2004), Uchida (2007), Calveras, Ganuza and Llobet (2007), Mitrokostas and Petrakis (2008), Baron (2009), Bottega and De Freitas (2009), Casadesus-Masanell et al (2009), Toolsema (2009) and García-Gallego and Georgantzis (2009).

<sup>5</sup> See Solferino and Becchetti (2008) and Conrad (2005).

<sup>6</sup> See Davies (2005) where the size of groups of consumers is exogenously given and Fanelli (2008) where it is not.

<sup>7</sup> Arora and Gangopadhyay (1995) apply this model to voluntary overcompliance of firms with established government standards. In their model the market gets segmented by income levels and firms with different levels of environmental-friendliness are able to charge different prices and achieve a positive profit. Choi and Shin (1992) modify the vertical differentiation model by Shaked and Sutton (1982) allowing for an uncovered market based on "taste diversity".

<sup>8</sup> In fact, most theoretical models focus on quality-related increases in either fixed or variable production costs. For example, see Crampes and Hollander (1995) and Lutz, Lyon, and Maxwell (2000).

<sup>9</sup> Kotchen (2006) develops a general model of private provision of a public good that includes the option to consume an impure public good. This article shows that, if a green market is not sufficiently large or environmental quality is not a gross complement for private consumption, introducing a green market may actually discourage private provision of an environmental public good and diminish social welfare. Besley and Ghatak (2007) find that firms that use CSR will produce public goods at exactly the same level as predicted by the standard voluntary contribution equilibrium for public goods, hence always leads to an excessive level of public goods. Baron (2007) considers the formation of firms that can engage in costly CSR and shows that shareholders rather than social entrepreneurs bear the cost, unless the CSR is a surprise. A social entrepreneur is willing to bear the cost either because doing so expands the opportunity sets of citizens in consumption-social giving space or because there is an entrepreneurial warm-glow from the firm's social responsibility. A social entrepreneur carries strategic CSR beyond profit and market value maximization. Baron (2008) presents a theory of CSR in the form of the private provision of public goods and private redistribution by a firm. In this article the firm privately provides the public good in response to the preferences of its consumers, shareholders, and managers, and if shareholders had altruistic preferences for the beneficiaries of the social expenditures more would be provided subject to any crowding out by government expenditures. In a more recent article Baron (2009) considers motivation underlying CSR in a setting in which firms compete directly in a market.

<sup>10</sup> Firms enter until profits are zero, thus, they can only capture the participation benefits that accrue to consumers but not the common benefits of having a positive quantity of the public good available.

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