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Corporate Social Responsibility in an Experimental Market

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***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 entails 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.

***Keywords*—**Corporate social responsibility, energy savings, public good, experiments, vertical differentiation, altruism.

I. Introduction

MILTON Friedman [1] argued that "only people can have responsibilities". This critical position towards corporate social responsibility is also apparent in neoclassical economists' recent statements. Other economists argue, in contrast, 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. Consistent with economic theories of the firm, [2] suggest that the economic case is not to reject CSR entirely, but to find an optimum level of CSR. Husted and Salazar [3] 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, [2] describe a variety of perspectives on CSR, which they use to develop a framework for consideration of the strategic implications of CSR. In [4], strategic CSR is defined as that used to attract socially responsible consumers, in the sense that firms provide a public good in conjunction with their marketing/business strategy. Attending to product differentiation, we can divide papers about strategic CSR into three different groups. The first group considers ethical consumption as a source of vertical product differentiation assuming that all the consumers prefer buying the product with a CSR characteristic than the product without such a characteristic. The vertical differentiation represents the CSR aspects of the production process that are perceived as a quality improvement of the final product by socially conscious consumers. The second group presumes horizontal product differentiation assuming that only some consumers prefer a particular product, but the preference is based on taste, rather than quality. The third group 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 paper relates to the aforementioned first group where product variants differ in their quality and consumers differ in their willingness to pay for quality, following the pioneering work of [5]-[8]. Unlike [9], we model the cost of quality as an increase in firm's fixed cost, constraining its subsequent actions, and hence the actions of its competitors. This insight applies to the regulatory arena as well as [10] show when they find that corporate leaders may strategically commit to modest environmental improvements that constrain regulators' ability to set tough standards.

Previous experimental work by [11] has established that consumers tend to support sellers with some pro-social activity and that this motivates firms to make socially beneficial investments in an effort to differentiate themselves from other, less generous sellers. In fact, it had been shown there that firms may end up in a prisoners' dilemma leading them to lower profits than if they had not become pro-social. However, in that paper, the consumer was treated as a black box. No motivation was clearly identified as to why consumers are willing to pay more for products sold by socially responsible firms. For example, it was not clarified whether a consumer supports a pro-social seller because he appreciates the costs incurred during the pro-social activity, or because the activity itself has a direct utility-increasing effect for the consumer.

While some oligopoly models predict that firms producing a higher quality product earn 'abnormal' returns, these findings hinge on the assumption that costs are constant and

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independent of quality. Furthermore, some economic models of CSR, like [4] 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.

Our paper relates with another two experimental papers. First, taking eco-labelling as an example of CSR, [12] 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 labeling. Second, [13] study ethical differentiation of products in triopolistic experimental markets with an exogenous determination of whether a producer is pro-social or not.

II. Experimental Design

Nine sessions were conducted, with a total of 324 participants. Experimental subjects were students at the University Jaume I, Spain. Using standard procedures, subjects were recruited among voluntary undergraduate students from different economics and business-related courses. Before the session started, subjects were randomly distributed into two separate rooms, one for subjects acting like consumers and one for those acting like firms. Inside each room, an experimentalist gave to each subject an identification number, read the corresponding written instructions and answered any remaining questions.

At the end of each session, subjects were privately paid in cash. A session lasted 150 minutes approximately and average earnings were 30€. Specific software, based on PHP programming, was created for this experiment. All sessions were carried out at Laboratorid'Economia Experimental in Castellón, Spain (LEE, http://www.lee.uji.es/).

Five treatments were implemented, respectively denoted as T0, T1, T2, T3 and T4. Each market consists of 9 firms and 9 consumers. Firms produce a homogeneous commodity at a constant unit cost equal to 100 ExCUs (Experimental Currency Units). The market lasts for 37 periods. Each period, the consumer must purchase a unit of the good and has to decide which company to buy from. To buy the product, each period the consumer starts with an initial endowment of 200 ExCUs. We use T0 as the baseline treatment. In the baseline treatment T0, each period, firms simultaneously decide the selling price for the product. Once the 9 firms have taken their price decisions, this information appears at the same time in the computer screens of all consumers. Consumers then must decide from which company to buy the unit of product. For consumers, per period earnings are calculated as the difference between the period endowment and the price paid for the unit. The total profits of the experimental subjects are equal to their accumulated earnings in the 37 periods.

In treatments T1 to T4, in addition to price, the firms have to choose the level of investment which has a positive externality to the environment represented as contribution to a pubic good, shared equally among all the consumers in the market. This variable has 5 possible levels, numbered 0 through 4, so that level 0 means no contribution, and level 4 involves maximum contribution to the public good. The fact that a company invests to become green has implications not only for firms but also for consumers. For firms, a higher level of contribution involves, in the actual period, a higher fixed cost of being 'different' but also a lower variable cost. Before the session starts, subjects are told that the government is prepared to subsidize part of the firms' investment. In a market in which firms invest in contributing to a public good, a higher level of investment implies, for consumers, a higher part from the contribution from the Public Fund (PF), independently of whether the consumer purchased from that firm or not. The time structure of the experiment for treatments T1-T4 is as follows. Firms play a three stage game. In the first stage, firms contribute to the public good. In the second, they compete in prices and, in the third, consumers choose which firm to buy from a unit of the product. While firms decide the selling price each period, the level of investment is a strategy for companies in the medium term, so they decide on that level every only in periods 1, 7, 13, 19, 25, and 31. In T1 and T2, each firm knows the information concerning the transactions made in the previous period. In T3, firms have a complete history on prices, demand and firm profits for each period in the past. In T4, the aforementioned complete history incorporates the investment level chosen by each company.

III. Firm Behaviour

Fig. 1 shows that, in the baseline Bertrand markets, firms have posted prices which have remained relatively close to the competitive price 100, while, at the same time, a significant amount of heterogeneity is observed, both in the absence (markets 1 and 2) and in the presence of contribution strategies (markets 3-18). In fact, in several markets, there have been systematic efforts to maintain higher than competitive prices, especially in the presence of an energy-saving strategy available to the firms.

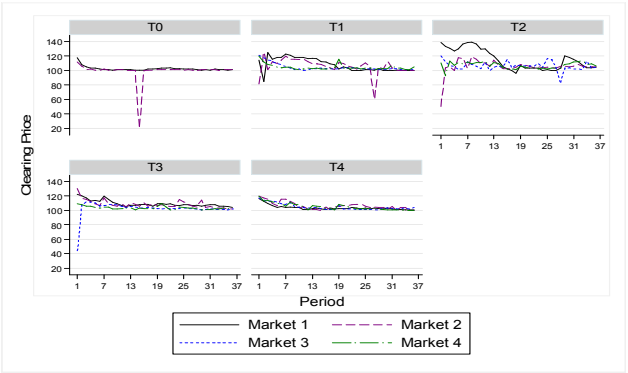

Fig. 1 Evolution of average clearing prices over time: Treatment aggregates

On the contrary, some markets have remained almost

perfectly competitive, including cases of markets with an energy-saving strategy available to the firms, like for example market 13. However, clearing prices (those at which consumers actually buy the product) have presented far less heterogeneous patterns, remaining much closer to the competitive level of 100 monetary units. This is more clearly reflected on average market clearing prices aggregated by treatment. Generally speaking, we observe tight convergence of clearing prices to the competitive level in all treatments implemented.

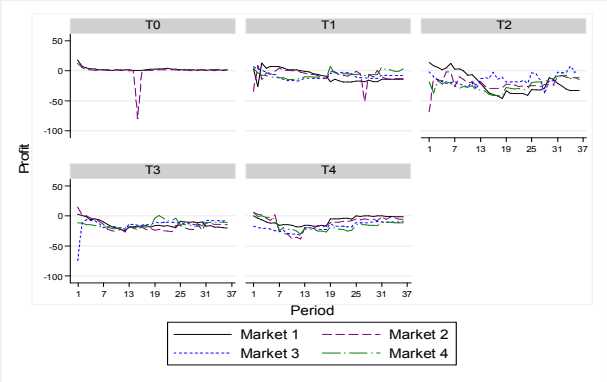

Fig. 2 Evolution of average profit over time: Treatment aggregates

When comparing prices obtained from the baseline treatment, T0 with those obtained in the other treatments (T1-T4), we find that both posted (M-W test, p= 0.0014) and clearing prices (M-W test, p= 0.0000) are significantly higher in the presence of CSR strategies, rather than in the absence of them. Therefore we can formally state the first result of our experiments:

RESULT 1: The adoption of energy-saving investments leads to higher posted and market clearing prices than the absence of such strategies.

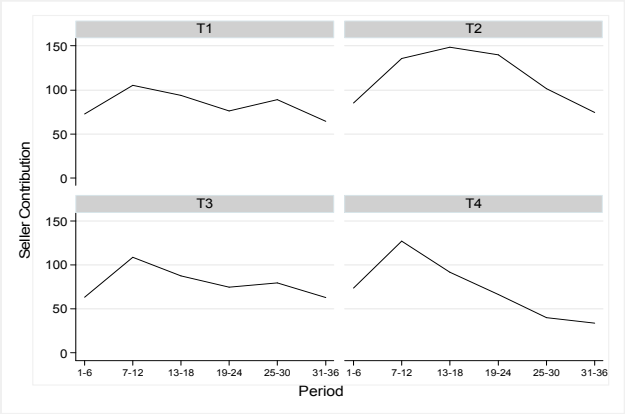

Fig. 3 Evolution of green investments over time: Treatment aggregates

Next, we refer to Fig. 3. We observe the evolution of firms' energy-saving investments as the result of their "altruistic" behavior. Contributions start relatively low and they rise during the early periods of the session, while they decrease over the remaining periods of the session.

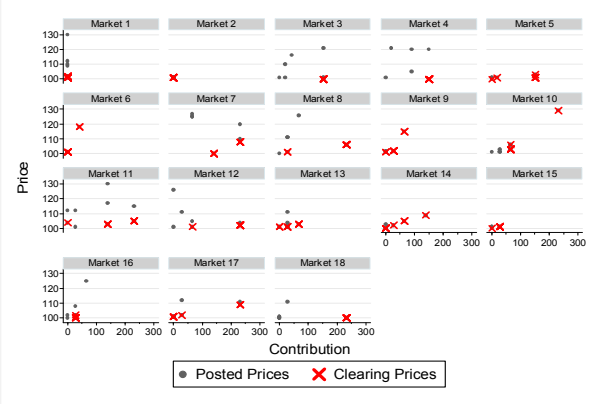

Fig. 4 Period 36 posted prices (dots) and purchasing decisions (marked with "x") per market

Fig. 4 represents pricing and purchasing decisions made in the last period of the session, using a bi-dimensional price-energy-saving space. Overall, we see that persistent dispersion exists in both sellers' and consumers' strategies. Firms tend to invest positive amounts to the greening of their production, posting at the same time higher than competitive prices. Firms tend to set close to competitive prices, even when they have invested maximal amounts to energy saving processes. Consumers also seem to be fairly homogeneous in their behavior, choosing sellers who are investing more. Sellers seem to recognize their ability to sustain higher prices when becoming greener thus differentiating from other sellers and consumers tend to increasingly enjoy firms' altruism at lower and lower prices.

RESULT 2: Firms adopting higher energy-saving investments tend to set higher prices, whereas they set lower prices when their rivals adopt higher energy-saving investments. Prices behave like in standard differentiated oligopoly models, exhibiting strategic complementarities.

Thus, adopting an energy-saving investment is like investing in higher product quality. It raises a firm's own price and decreases the rivals' prices, whereas prices exhibit the standard strategic complementarity pattern.

The most interesting pattern obtained on firm behavior is reflected on Fig. 3. While the baseline treatment has yielded the perfectly competitive outcome, driving firms' profits down to zero, markets with energy saving available to the firms have been clearly unprofitable. We have also formally compared profits in T0 to profits in treatments T1-T4 and found that, in the latter, firms have earned significantly lower profits (M-W test, p=0.0000). We formally state next this finding:

RESULT 3: When firms adopt energy-saving investments, their gains from relaxing price competition do not compensate their increased costs.

IV. Consumer Behaviour

We report the results on consumer behavior relying on regression techniques and taking advantage of the panel data structure of our sample. The demand variable is an ordered categorical variable taking the value from 1 to 9.

RESULT 4: Consumers react to energy-saving investments as if these were quality improvements in a firm's product. Prices have the expected effect on own and rival demand.

RESULT 5: Consumers prefer energy-saving manufacturers for the effect of energy saving on the environment, rather than as a way of compensating them for the extra costs incurred.

Finally, as stated earlier, the action of policy makers towards socially responsible firms and its impact on consumer and, finally, firms' strategies is important be studied. The working hypothesis here is that institutional support towards energy saving may affect consumers' responses towards socially responsible firms and, eventually, the socially responsible strategies of the latter. The possibility of a "first-order" negative effect of extrinsic incentives on intrinsic ones has been studied under the term "crowding out". According to the "Not Just for the Money" principle, such a subsidy may first, "crowd out" intrinsic genuinely altruistic motivations in firms' socially responsible action. This would correspond to the well-known first-order crowding out effect. In our first model, we uncover this undesirable crowding-out effect of public subsidies to pro-social firms especially in lower levels of social contribution.

RESULT 6: Subsidies to energy-saving producers may have a crowding-out effect, reducing the consumer's intrinsic willingness to support a firm's corporate social responsibility.

V. Conclusions

Our findings confirm that energy-saving investments have similar effects to those of vertical product differentiation. Firms adopting higher energy-saving investments behave as if they were selling a superior product, allowing them set higher prices. However, they end up competing too much among them, lowering their prices close to competitive levels. Thus, they do not recover their energy-saving costs and incur losses. This, turns their ex ante profit-driven strategy into an ex post purely altruistic contribution to the public good.

Consequently, consumers deal with energy-saving firms' products as if they were the result of costly quality improvements. Regarding consumer behaviour, we are the first to show that consumers exhibit a higher willingness to pay for energy-saving firms' products due to the positive externality this has on the environment, rather than as a way of compensating them for the extra costs they incur. We are also the first to show that public subsidies to energy-saving firms may have an undesirable crowding-out effect, as they reduce the consumer's intrinsic willingness to support energy-saving manufacturers.

Both results have critical implications for economic policy in product markets with energy-intensive production processes, as they suggest that consumers may not appreciate firms' investment as a cost to the seller but as a benefit to the society as a whole. Finally, subsidies could overlap in an undesired way with intrinsic motivations, failing to achieve the pretended efficiency-inducing outcomes.

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