Green consumerism and pollution control[☆]

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ARTICLE INFO

ABSTRACT

In this paper, we show that collective action by environmentally aware/green consumers, who derive benefits from consuming environmentally cleaner products, can reduce pollution and improve social welfare in the same manner as pollution taxes or subsidies for reducing pollution can. We construct a model with two competing firms each producing a good of different environmental quality and two types of consumers with high and low preferences for environmental quality and characterize a benchmark equilibrium in which each consumer acts individually and disregards that his decision to buy a good may affect the level of pollution. We then show that, compared to the benchmark equilibrium, collective action by consumers with high preference who take into account the impact of their combined decision to buy a good on pollution will result in an equilibrium with not only lower pollution and higher social welfare, but also higher prices and profits for the firms.

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1. Introduction

Consumption of certain goods generates both *private* and *public* benefits. For instance, a consumer benefits directly from consuming organic food because it is more nutritious and healthier with fewer risks to personal health from pesticides and herbicide residues. However, organic farms are also more sustainable and environmentally better than conventional farms because they do not release synthetic pesticides or herbicides into the environment. Thus, consumption of organic food not only directly benefits a consumer, but also helps indirectly in preserving and sustaining the ecosystem which benefits all consumers.[1] The same positive relationship between private and public benefits also holds if the consumers *perceive* the quality of goods produced with cleaner technologies and inputs to be higher, though there may be no *real* difference. For instance, electricity produced from renewable energy may be perceived as better than that produced from coal, though there is no real difference in its quality when consumed. More generally, a consumer may drive additional utility (i.e., private

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[1] Other interesting examples include coffee grown under the canopy of tropical forests, rather than in open deforested fields, which tastes better as well as helps preserve forests. Some additional examples are discussed in the concluding section.

benefits) from the consumption of a good simply from knowing that it will contribute less to pollution. This is known as the "warm glow" effect (see Andreoni (1990) and Ribar and Wilhelm (2002)).

It is well-known that higher private benefits from the consumption of a good, whether real as in the case of organic food or altruistic as in the case of green electricity, can induce consumers to pay more for it and firms to invest in cleaner technologies, see e.g. Arora and Gangopadhyay (1995).[2]

A number of authors including Cremer and Thisse (1999), Bansal and Gangopadhyay (2003), and Erikkson (2004) among others consider models of price competition and product differentiation when consumers are environmentally aware. These models address many important questions concerning the impact of green consumerism on market equilibrium and the role of various economic instruments such as pollution taxes or subsidies for reducing pollution. But all of them are concerned with *individual* action by consumers and accordingly assume that each consumer takes the pollution level as given exogenously. However, if some consumers come together and decide *collectively* which good to buy, then they can influence the pollution level. For instance, if all consumers sharing a common economic-ecological system decide collectively to buy only organic food, then, besides the private benefits from the consumption of organic food, each consumer will also benefit from a better preserved and more sustainable ecosystem which is free from pesticides and herbicides.[3] The Organic Consumers Association (OCA) in the US is one such example of mobilization of hundreds of thousands of consumers who buy only organic food.[4]

Economic implications of collective action by green consumers have not been studied previously. In this paper, we construct a model for analyzing the impact of collective action by green consumers on prices, pollution, and social welfare. The model consists of two competing firms each producing a good of different environmental quality and two types of consumers with high and low preferences for environmental quality. A consumer – of either type – acting individually disregards that his action may affect how a good is produced, while when some consumers act collectively they may influence upon production, e.g. which technologies are used and which goods are produced, which in turn affects the pollution level. We first characterize a benchmark equilibrium in which consumers act individually and even the consumers with high preference choose to buy the cheapest product leading to highest pollution. We then characterize another equilibrium in which the consumers with high preference for environmental quality form a coalition and decide collectively which good to buy taking into account the combined impact their decision will have on pollution. Accordingly, we treat pollution level as a choice variable in the individual utility maximization problems of the consumers who decide collectively which good to buy and show that in the resulting equilibrium they buy the higher-priced good with higher environmental quality leading to lower pollution and equilibrium prices such that no member of the coalition *individually* will have incentive to leave the coalition and "free-ride". Thus the coalition once formed, will remain formed and not collapse. In fact, as will be shown, if some consumer with high preference for environmental quality did not join the coalition initially, he will have incentive to join it later after the new equilibrium is established.

Our analysis shows further that collective action by consumers with high preference for environmental quality reduces competition and leads to higher equilibrium prices for goods of both qualities. That is because the firm producing the good of higher environmental quality can charge a higher price if the consumers who form a coalition take into account the favorable impact their combined decision to buy the good of higher environmental quality will have on pollution. As a result the firm producing the good of lower environmental quality can also charge a higher price. Overall, we show that collective action by consumers with high preference for environmental quality not only leads to lower pollution, but also improves social welfare in the same manner as can pollution taxes or subsidies for reducing pollution. In fact, as will be shown, collective action may even lead to optimal control of pollution if the difference in the preferences of the two types of consumers is sufficiently large.

The paper is organized as follows. Section 2 describes the model. Section 3 motivates and characterizes the benchmark equilibrium under the assumption that each consumer acts independently and each firm maximizes its profit, taking the price of the other firm as given. Section 4 motivates and characterizes the equilibrium when consumers with high preference for environmental quality form a coalition and decide collectively which good to buy taking into account the combined impact their decision will have on pollution. Section 5 compares the two equilibria and studies how collective action by consumers impacts the market equilibrium, pollution, and social welfare. Section 6 draws the conclusion.

2. The model

A simple model of preferences for a vertically differentiated product was developed by Mussa and Rosen (1978) and applied to the analysis of vertically differentiated product markets by Gabszewicz and Thisse (1980) among others. An abundant literature developed from these applications. The model in the present paper is an extension of the Mussa-Rosen model in that it introduces the idea that some agents may form a coalition and decide *collectively* which product to buy.

The model consists of two firms each producing a good of different environmental quality. The environmental quality of a good is positively related to cleanliness of the technology and inputs used to produce it – the cleaner the technology

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[2] See also Arora and Cason (1996) and Cornes and Sandler (1996).

[3] The underlying assumption here is that the consumers share a common environment in which both consumption and production take place.

[4] It is an association of consumers with an explicitly stated goal to promote a more responsible and sustainable approach to food production.