Too much of a good thing? Why altruism can harm the environment

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Abstract: Success of eco-labeling schemes, broadly defined, varies among products and across countries. Based on a simple theoretical framework, we show that the nature of environmental attributes among products (*i.e.*, private *versus* public) and the consumer type (*i.e.*, egoist *versus* altruist) shape the overall performance of such schemes. In addition, we demonstrate that altruistic consumers exhibiting a too high willingness to pay for the eco-labeled product can inadvertently prevent egoistic consumers from purchasing it, leading to a sub-optimal outcome in terms of environmental performance. Several policy and managerial implications are drawn.

Key words: altruism, eco-labels, egoism, public goods.

JEL Classification: D11, D21, L15.

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1. Introductory remarks

Most developed countries and several transitional economies have introduced eco-labeling schemes in their policy arsenal, such as the Blue Angel program created in 1977 in Germany. In addition to governmental or quasi-governmental schemes, private initiatives have proliferated worldwide to distinguish products on the basis of their environmental qualities. Nevertheless, some eco-labeling schemes are more successful than others. The performance of eco-labeling schemes as measured by the number of products or categories vary greatly from a country to another. For example, the German Blue Angel includes more than 3.500 products and services in 80 product categories while the French eco-label NF-Environnement includes only about 250 products in 15 categories. Moreover, even under the same scheme, the market share of eco-labeled products varies significantly from a product to another.

Unlike the academic literature that has mainly considered eco-labels' performance in relation with their ability to address asymmetric information (*e.g.*, Caswell and Mojduszka, 1996; Teisl and Roe, 1998; McCluskey, 2000), we contend that the differences in eco-labeling schemes performances also depend on the 'more or less' public or private nature of environmental attributes (Kotchen, 2005, 2006; Nunes and Riyanto, 2005) and on the egoistic or altruistic motives of consumers. As far as we know, an adequate analysis of these two dimensions in an unified framework is still missing. The main contribution of this paper is to

fill this gap by showing that an eco-label performance also results from its ability to address the nature of environmental attributes issue in relation with the consumer type[1].

We develop a simple theoretical framework in which environmentally friendly attributes signaled by an eco-label are either private or public. Private environmental attributes may be lower energy consumption, less pesticide residues or longer durability. Public environmental attributes may be lower emissions of greenhouse gazes or chemicals harming the ozone layer. In the case of private environmental attributes, producers can charge a premium on egoistic consumers because environmental attributes imply exclusive benefits. In the case of public environmental attributes, only altruistic (or environmentally concerned) consumers exhibit a positive willingness to pay a premium, contrarily to opportunistic consumers, who are free riders and unwilling to pay for it. In sum, the contribution addresses the following issues: Does a firm has a vested interest in using an eco-label (and thus reducing pollution) or not? Should it have a niche market strategy or rather sell to a larger public? Is the environmental outcome related to the provision of eco-labeled products optimal?

The remainder of this paper is organized as follows. In the next section, we emphasize the crucial role of the interplay between the nature of environmental attributes (private *versus* public) and the consumer type (egoistic *versus* altruistic) regarding eco-labeled products. Section 3 is devoted to the study of the interaction between the strategy of a monopolist firm and consumers' type that affects the environmental performance of the eco-label scheme. Section 4 draws some policy implications and concludes. All along the paper, illustrative examples are provided.

[1] This issue is not only related to eco-labeling markets but also to other environmental activities such as recycling and support of environmental organizations.

2. Nature of environmental attributes and consumer type regarding eco-labeled products

The environmental attributes of products can be either private or public and the proportion of each type varies across products. For example, Loureiro and Lotade (2005) argue that in the case of coffee, 'consumers may perceive the health benefits associated with organic coffee consumption as much lower than those derived from the consumption of organic fruits and vegetables.' Organically grown vegetables generate less soil and water pollution but also reduce the pesticide residues in food products. While the former attributes have a significant public dimension, the latter have clearly a private dimension because consumers perceive these lower levels of pesticide residues as preventing health problems. For example, Søndergaard *et al.* (1998)[2] showed that the most important reasons for purchasing ecological food in Spain, Germany, and Denmark were their higher quality, taste, and health compared to conventional food products. CEC (1999)[3] found that shade grown coffee is perceived by consumers as superior in taste and quality. Finally, the French Federal Consumers Union argues that consumers 'often perceive environmentally friendly practices in farming and breeding as an indicator of the food safety and taste of the final product'[4] (Grolleau and Caswell, 2006). For a wood product coming from a sustainable managed forest, eco-friendly electricity or dolphin-safe tuna, the private benefits from the environmental quality seem to be

[2] Quoted in Søndergaard, H.A., 1999, Consumer Attitudes Towards Sustainable Fishing and Ecological Fish, MAPP Newsletter 8, 5-6, http://www.mapp.asb.dk/WPpdf/Newsletters/newsletter08.pdf (accessed March 23, 2006).

[3] Commission of Environmental Cooperation (CEC), 1999, Measuring Consumer Interest in Mexican Shade-grown Coffee: An Assessment of the Canadian, Mexican and US Markets, Montreal, Canada, http://www.cec.org/files/PDF/ECONOMY/shade_en.PDF (accessed January 11, 2008).

[4] Union Fédérale des Consommateurs, 1998, Les consommateurs et le monde agricole, Paris.

much weaker, if any. Indeed, consumers consider the environmental quality derived from sustainable managed forests as mostly public, *e.g.*, carbon storage, reduction of greenhouse gases and landscape provision.

Regarding the public nature of environmental characteristics, Kotchen (2006) analyses environmentally friendly goods by considering that consumers either consume a pure private good (conventional coffee) and contribute to a pure public good (donation for biodiversity conservation) or consume an impure public good which provides jointly the private good and public good (shade-grown coffee). The joint production benefits from a greater efficiency and the public good provision is not motivated by unconditional altruism (warm glow). Among other results, Kotchen (2006) shows that the introduction of environmentally friendly goods can have beneficial or detrimental effects on environmental quality and social welfare, depending on whether the private good and the environmental benefits are complements or substitutes. In a related contribution, Nunes and Riyanto (2005) emphasize three conditions that determine the ability of an eco-labeling scheme to preserve biodiversity (considered as a public good) namely consumers' awareness, sensitivity of production costs to the certification scheme and the demand elasticity.

Consumers may be labeled either as altruists or egoists. While the overlap is not perfect, this distinction shares features with that of Nyborg (2000) between *homo economicus* and *homo politicus*. While the former is only motivated by his personal well-being, the latter considers the subjective social welfare function only. This postulate is supported by experimental evidence. Environmental preferences encompass a large range of motives from pure egoistic concerns to pure altruism. Between these extremes, consumers may exhibit different forms of impure altruism such as 'warm glow' motivations (Andreoni, 1990), status seeking through

the consumption of public goods (Solnick and Hemenway, 2005), and identity concerns (Akerlof and Kranton, 2000). Sunstein and Ullmann-Margalit (2001) argue that 'contrary to a common picture of relationships in a market economy, people often express communal and membership-seeking impulses via consumption choices, purchasing goods and services because other people are doing so. Shared identities are maintained and created in this way'. For example, in a study of the Nordic Swan eco-label for several products –toilet tissue, kitchen paper towels, compact laundry detergents – Bjorner *et al.* (2004, see also Teisl *et al.*, 2002) concluded that consumers were driven by altruistic motives because the products were not providing any direct additional benefit.

Based on the previous discussion, we assume the following utility function for a consumer i:

$$U_i = (\gamma z + \alpha_i (n-1) z + z) D_i + z D_{-i} - p_z D_i \qquad (1)$$

D_i represents the consumption decision of consumer i and is equal to 1 if he decides to buy one unit of the eco-labeled product, and 0 otherwise. D_{-i} represents the demand of all other individuals. $z \in [0,1]$ represents the signaled environmental attribute of the eco-label. The parameter γ represents the complementarity between private and public characteristics. Indeed, private and public characteristics can be perceived either as complementary ($\gamma > 0$) or substitutes ($\gamma < 0$). For instance, an organic food is often considered as better for health than a conventional food, while environmentally friendly detergents are generally considered as less cleaning. α_i represents the consumer type. $\alpha_i = 0$ if the consumer is egoistic, that is, only motivated by private benefits of the eco-label. $\alpha_i \in]0,1]$ if the consumer is altruistic, that is, willing to pay for public characteristics. n represents the number of individuals in the economy. Finally p_z represents the price of the eco-labeled product. For an egoistic consumer the direct utility from buying an eco-labeled product is $(\gamma + 1) z$, while an altruistic

consumer gets an additional positive utility of $\alpha_i(n-1)z$ from creating public benefits to the entire economy. Moreover, each individual in the economy benefits from the public benefits resulting from the overall consumption of eco-labeled products, denoted zD_{-i}, regardless of whether he decides to buy or not an eco-labeled product. Four cases can be distinguished according to the nature of the environmental attribute and the consumer type, as described in table 1.

[Insert Table 1 around here]

Let us point out the main discrepancies between egoistic and altruistic consumers. The former is willing to pay a price premium if the eco-labeled product provides private benefits. These private benefits depend on the quantity of private characteristics that are complementary with the public benefits offered by the eco-label. So his willingness to pay for the eco-labeled product is equal to $(\gamma+1)z$. In other words, the egoist behaves as a neoclassical *homo economicus*. The altruistic consumer enjoys not only a higher environmental quality, but also enjoys that other individuals in the society benefit from this higher environmental quality. His willingness to pay for the eco-labeled product is equal to $(\gamma+\alpha(n-1)+1)z$. The extreme case arises when $\alpha=1$, where the altruist behaves as a public policy maker (*homo politicus*).

Let n_0 and n_1 be respectively the number of egoists and altruists in the economy, with $n=n_0+n_1$. We assume that the level of altruism α is identical for all altruistic consumers.

The total demand for eco-labeled products ($D_z=\sum_{i=1}^{n} D_i = n_0 D_0 + n_1 D_1$) can be derived from equation 1 as:

$$D_z=\begin{cases} n & \text{if } p_z \le (\gamma+1)z \\ n_1 & \text{if } p_z \in](\gamma+1)z,(\alpha(n-1)+\gamma+1)z] \\ 0 & \text{if } p_z > (\alpha(n-1)+\gamma+1)z \end{cases} \quad (2)$$

If an eco-label promises mainly private benefits (*i.e.*, high level of complementarity between private and public attributes), the eco-label might also be suitable for egoistic consumers. Even when the willingness to pay for the eco-labeled product is smaller for egoists than for altruists, a producer is confronted to the following issues: the type of consumers to target and the extent to which the environmental quality of the product should be increased.

3. Strategy of the firm regarding the eco-label

We focus on the strategy of a firm setting an eco-labeled product on the market.[5] The firm choses successively the quality level of the eco-label (z) and the price of the eco-labeled product (p_z). The objective function of the firm is the following: $\pi = p_z D_z - C(z)$, where $C(z)$ represents a monotone and convex cost function, that is, costs are increasing with the environmental quality provided by the eco-label. $C(z) = \frac{a}{2} z^2$, where a is a positive parameter.

3.1. Optimal price decision

By backward resolution, we can determine the optimal pricing strategy for the monopolist. The monopolist makes a trade-off between selling to all consumers (n) at the low price of $(\gamma + 1)z$ or selling only to altruistic consumers (n_1) at the high price of $(\gamma + \alpha(n-1) + 1)z$. We show that the success of eco-labels is defined by the respective number of altruists and egoists in the economy, the degree of pro-social behavior of the altruists and the degree of complementarity between private and public characteristics. Figure 1 depicts this relationship.

[5] Despite its interest, we do not take into account competition between firms. The monopoly setting allows us to focus on the impact of consumer preferences on eco-labeling. Other contributions address related issues in a competitive environment (*e.g.*, Ibanez and Stenger, 2000; Kotchen, 2006; Ibanez and Grolleau, 2008). Studying whether competition modifies our results constitutes a natural extension.

[Insert Figure 1 around here]

Several interesting results can be drawn from Figure 1. If the degree of complementarity between public and private characteristics is low, that is, $\gamma + 1 < \frac{\alpha n_1 (n-1)}{(n-n_1)}$, the relative price difference between the 'niche market' strategy (*i.e.*, selling to altruists only) and the 'mass appeal' strategy (*i.e.*, selling to both altruists and egoists) is high, which is likely to push the monopolist to sell the eco-labeled product to altruistic consumers only. The niche market strategy might arise even when there are few altruists in the economy. In this case, altruists are willing to pay a much higher price for the eco-labeled product than egoists (since no or little private benefits are associated to the eco-label). The monopolist's profit is higher by selling only to few (altruistic) consumers at a high price, rather than to all consumers at a lower price. Moreover, if the number of altruists is high, the monopolist has a vested interest in adopting a niche strategy pricing.

Proposition 1: If the level of altruism is high, i.e., $\alpha > \frac{(n-n_1)(\gamma+1)}{(n-1)n_1}$, *altruists prevent egoists from purchasing eco-labeled products.*

Proof:

Only altruists buy the product at this price if $\pi((\alpha(n-1)+\gamma+1)z) > \pi((\gamma+1)z)$, which is true if $n_1(\alpha(n-1)+\gamma+1)z > n(\gamma+1)z$.

End of the proof.

A counter-intuitive outcome can occur when only altruists purchase the eco-labeled product. In this particular case, their willingness to pay for the eco-labeled product is high (compared to the willingness to pay of egoists). More precisely, altruists are highly concerned by reducing negative externalities thanks to their consumption choices. Nevertheless, an

obsessive motivation to increase social welfare can prevent egoistic consumers from purchasing the eco-labeled product.[6] A less pronounced pro-social behavior (*i.e.*, α is low) can then increase the overall environmental benefit of the eco-label. Interestingly, the altruist seeks to maximize the environmental benefit of *his* consumption on others but fails to consider the indirect impact of his WTP on the monopolist strategy and ultimately on the market share covered by the eco-label.

Finally, for many outcomes, the complementarity between public and private characteristics allows to overcome market imperfections as it pushes the monopolist to sell to all consumers.

3.2. Optimal environmental quality of the eco-labeled product

We analyze the global impact of altruists' behavior in terms of environmental quality. Indeed, even if the pro-social concern of altruists is high and a small number of consumers have access to the eco-labeled product, the public benefits created by the eco-label depend on the environmental quality level provided by the monopolist. If the eco-labeled product is sold only to altruists (respectively to all consumers), the monopolist fixes the environmental quality of the eco-labeled product at the level $z_{n_1}^* = \frac{n_1(\alpha(n-1)+\gamma+1)}{a}$ (respectively $z_n^* = \frac{n(\gamma+1)}{a}$). So, the environmental quality level per unit of product is always higher when only altruists buy the eco-labeled product than when the monopolist adopts a mass appeal strategy, that is, $z_{n_1}^* > z_n^*$ if $\gamma + 1 < \frac{\alpha n_1(n-1)}{(n-n_1)}$. Nevertheless, despite a higher environmental

[6] Of course, we assume that the monopolist cannot discriminate between the two groups. If price discrimination is possible, for example by selling to altruistic consumers through specific retailers, this counter productive effect is less likely to occur.

quality, the total level of public benefits is not necessarily optimized when only altruists purchase the eco-labeled product. As depicted in Figure 2, if $n_1 z^*_{n_1} < n z^*_n$ the overall environmental quality is lower when only altruists purchase the eco-labeled product. In other words, the environment would be better off with an eco-label that provides a lower environmental quality but addressed to all consumers.

[Insert Figure 2 around here]

Proposition 2: If the altruistic behavior is such that $\alpha \in \left[\frac{(n-n_1)(\gamma+1)}{(n-1)n_1}, \frac{(n+n_1)}{n_1} \cdot \frac{(n-n_1)(\gamma+1)}{(n-1)n_1} \right]$, *altruists reduce the overall environmental benefits by preventing egoists from purchasing eco-labeled products.*

Proof:

If $\alpha < \frac{(n-n_1)(\gamma+1)}{(n-1)n_1}$, all consumers buy the eco-labeled product and $z^*_{n_1} < z^*_n$. Then, $n_1 z^*_{n_1} < n z^*_n$.

If $\alpha > \frac{(n-n_1)(\gamma+1)}{(n-1)n_1}$, only altruists buy the eco-labeled product and $z^*_{n_1} > z^*_n$. Then

$n_1 z^*_{n_1} > n z^*_n$ if $n_1 n_1 (\alpha(n-1)+\gamma+1) z > n n (\gamma+1) z$, which implies that

$\alpha > \frac{(n+n_1)}{n_1} \cdot \frac{(n-n_1)(\gamma+1)}{(n-1)n_1}$.

So, $n_1 z^*_{n_1} < n z^*_n$ if $\alpha \in \left[\frac{(n-n_1)(\gamma+1)}{(n-1)n_1}, \frac{(n+n_1)}{n_1} \cdot \frac{(n-n_1)(\gamma+1)}{(n-1)n_1} \right]$.

End of the proof.

4. Concluding remarks

Analyzing eco-labeling schemes in terms of information asymmetry is obviously useful, but insufficient. We have introduced two additional dimensions, namely the private or public nature of the environmental attributes and the number of altruistic and egoistic consumers in

the society. We have shown that the interplay between these two dimensions also shapes the success of eco-labeling schemes. Consequently, designers, promoters and end users of eco-labeling schemes must take into account this two-dimensional issue. This perspective provides a better understanding of why eco-labels on the same kind of products[7] perform differently in different countries according to the respective number of altruists and egoists. Our contribution also outlines the importance of marketing strategies tailored to different subgroups of consumers to avoid a 'one-size-fits-all' situation.

Understanding the interplay between the private/public nature of products and the consumer type is crucial to anticipate the success of eco-labeling schemes. *First, do consumers consider the promised environmental attributes as private or public?* To some extent, the degree of (perceived) privateness or publicness may be influenced. We especially focus on how the private benefits can be 'improved' to attract egoists. Increasing the degree of privateness of goods may take different routes either objective (*i.e.*, scientifically based) or subjective (*i.e.*, by playing on consumers' perception).[8] The associated cost (and the marginal benefit of increasing privateness) varies among categories of eco-labeled products, partly because of *ex ante* consumers' perceptions (see *e.g.*, Loureiro and Lotade, 2005). This cost is intuitively lower for less consuming energy products or agro-food stuff than for eco-friendly wood or green electricity. Promoters of eco-labeling schemes may have interest in increasing

[7] In this sentence, we consider that the private or public nature of the environmental attributes is fixed.

[8] To increase the perceived privateness, some eco-labels emphasize the benefits for local public goods, *e.g.*, the countryside or local groundwater rather than benefits for global public goods, *e.g.*, the ozone layer. A typical example of such a strategy is the locally grown labels promising to purchasers the benefit from the environmental improvement near to their home. In a widespread add in Munich, consumers are informed that buying 1 liter of milk or 100 grams of cheese from their water collecting area helps keep 12 500 liters of drinking water clean.

perceived privateness until the marginal cost of doing so equals the expected benefit. Knowing the degree of privateness that can be reached for a given cost can inform policymakers who can compare and select product categories according to the overall expected environmental net effect. Nevertheless, such investments may profit to all firms producing the same product (because of reputational spillovers, the subsequent benefits may have public goods properties), making the investment less likely to occur because the investor does not capture the whole return of his investment.

Second and related to the previous issue, *do consumers adopt an altruistic or egoistic behavior,* for a given product? The consumer type is not necessarily fixed over products and over time. The same consumer may behave in an altruistic way for some products while behaving egoistically for other products. Intuitively, the inadequate matching between the emphasized environmental attributes and the consumer type can lead to the failure of the eco-label scheme. Promoters of eco-labeling schemes can attempt to induce (impure) altruism, for example, by increasing and emphasizing status benefits[9] resulting from the consumption of eco-labeled products.

In a real-world context, consumers can develop different levels of altruism over time. Without attributing an overall egoistic or altruistic nature to consumers it is well-known that German consumers exhibit a higher level environmental consciousness than their French counterparts regarding environmental attributes of products. Anecdotically, the comparison of charitable giving between France and Germany shows that German citizens are more generous in terms

[9] The success of the hybrid car of Toyota, the Prius model among environmentalists was partly attributed to its ability to confer social status on Prius drivers compared to other car manufacturers with similar hybrid models (*e.g.*, Honda) (Naughton, K., Chapman, M., 2007, A Case of Prius Envy, *Newsweek*, September 3).

of individual giving in percentage of GDP (0.22) than French citizens (0.14),[10] which is consistent with our intuition. This difference can be due to attribution bias and educative policies that are older in Germany compared to France and which can lead to internalized norms, especially in certain fields (Müller, 2002).[11] Even in the same country, the French part of Switzerland is known for being less sensitive to environmentally-friendly labels than the German part (Beda, 1998). An empirical application of our model would be to regress the success of an eco-labeling scheme on a given product on the level of altruism measured in each country, if possible in relation with the product investigated. For example, using psychometric scaling techniques can allow to measure individuals' degree of altruism on a representative sample in each country and to test some insights suggested in our contribution (see Lusk *et al.*, 2006)

In sum, environmental differentiation can fail if it does not consider the multi-dimensional character of eco-labeling schemes. While our modeling framework presents a simplified mechanism by which eco-labeling schemes can harm the environment, it does not make justice to other dimensions such as the performance of eco-labeling schemes as measured by the number of products and the welfare optimality. A natural extension is to model the substitution between the eco-labeled version and conventional version. Indeed, this possibility will influence key parameters of the modeling framework, especially the monopolist's pricing strategy.

[10] Charities Aid Foundation (CAF), 2006, International Comparisons of Charitable Giving, November 2006 CAF briefing paper, http://www.cafonline.org/pdf/International%20Comparisons%20of%20Charitable%20Giving.pdf (accessed December 19, 2008).

[11] The Blue Angel scheme was launched in 1977 in Germany while the NF-Environnement scheme was launched in 1992 in France.

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Table 1: The conceptual framework to analyze the purchase of eco-labeled products

		Consumer type	
		Egoist	Altruist
Nature of product attribute	Private attributes	Concerned	Concerned
	Public attributes	Not concerned	Concerned at the level α

Figure 1: Optimal pricing of the eco-labeled product for a monopolist

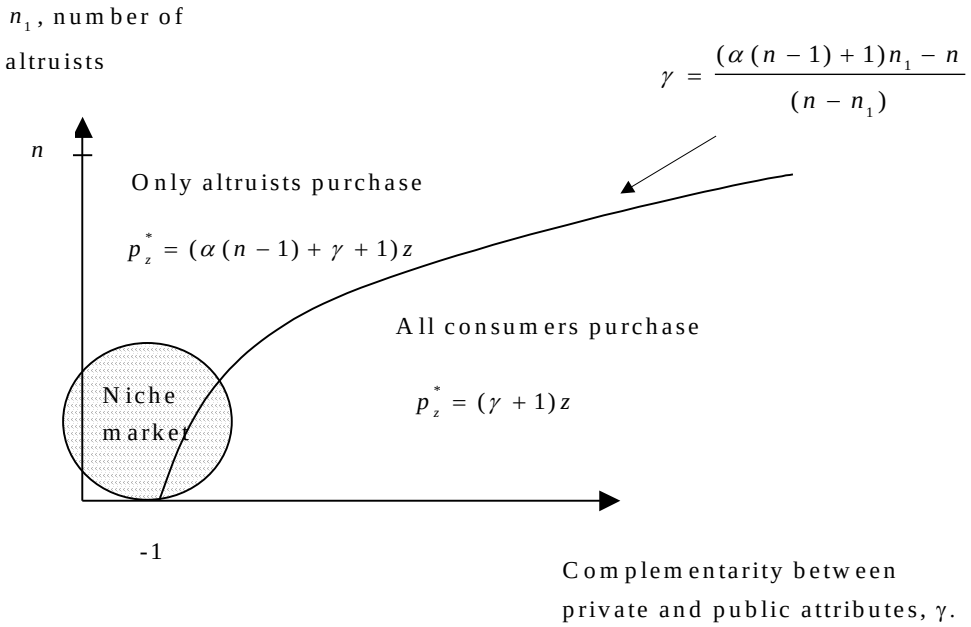

Figure 2: The overall environmental quality provided by the eco-label